APPEARANCE CHARACTERISTICS AND PRODUCTION ABILITY OF NUCLEAR BAU BEN DUCK FLOCK

Vol 107. January, 2020. Pp. 2-11

Nguyen Van Duy, Nguyen Thi Thuy Nghia, Nguyen Duc Trong, Vuong Thi Lan Anh and Le Thi Mai Hoa

Corresponding author: Dr. Nguyen Van Duy; Tel: 0913151718, Email: duynv.vcn@hotmail.com

The nuclear Bau Ben duck flock has been used for 4 generations at Dai Xuyen Duck Breeding and Research Center from 2012 to 2015, the aim: to estimated Appearance characteristics and production ability of nuclear Bau Ben duck flock. The results showed that: These ducks have uniform color of feather and beak at 1 day old, 8 weeks of age and adults. The survival rate of Bau Ben ducks was high and gained of 96.08 - 97.50%. The body weight at 8 weeks of age gained 1282.3 - 1352.3 g/bird, the body weight at 21 weeks of age was 1842.5 - 1876.3 g/bird. The age of laying was 150 - 153 days old, the laying rate was 44.16 - 46.50% and the egg yield was 164.65 - 169.26 eggs/female/ 52 weeks of laying, the feed consumption was about 3.83 - 4.76 kg/10 eggs. The egg weight was about 70.34 g and Haugh unit was 90.90. The fertility rate reached to 92.06 - 95.06%, the hatching rate / fertility eggs was from 85.14 - 87.13%; the hatching rate /total incubated eggs was about 80.35 - 82.78%. The nuclear Bau Ben duck has an appearance and stable production ability for 4 generations.

Keywords: *Bau Ben duck, characteristis, body weight, egg production*.

PRODUCTION OF DA15-16 CHICKEN BREED RACE THROUGH GENERATION

Vol 107. January, 2020. Pp. 12-21

Pham Thi Thanh Binh, Nguyen Thi Muoi, Tran Quoc Hung, Nguyen Trung Hieu, Nguyen Thi Hai, Chu Thi Thanh Thuy, Ngo Thi To Uyen and Tran Thi Thu Hang

Corresponding author: Pham Thi Thanh Binh; Tel: 0982.217.287; Email: binhpham7287@gmail.com

DA15-16 chickens were imported to Vietnam since 2016 from the DA15 project in order to survey and evaluate the unique appearance the production ability of DA15-16 chickens through generations from 2016 - 2019. The study was conducted at centre of applied research and livestock genetic conservation from 2016 - 2019 to assess the production physical appearance characteristics and production ability of DA15-16 chickens. Experiment was arranged according to the method of a completely JG. Experimental results showed: DA15-16 chickens have homogeneous white milky fur, black skin and black leg skin. Survival rate of DA15-16 chickens was high, from 0 - 8 weeks of 96.01 - 96.46%. The period of 9-20 weeks old, roosters reach 96.61 - 97.14% and in hens was 97.06 - 97.54%. Average weight of 20-week-old rooster reach 2589.33 - 2669.33 g; of hen reach 1865.33 - 1935.33 g. DA15-16 chickens have the first egg age (147-151 days of age). The number of eggs was 73.75 - 76.05 /hen/52 weeks of age and feed consumption was 3.46-3.44 kg; ingot rate of DA15-16 chicken was 88.90 - 90.20%.

Keywords: *Chicken DA15-16, the generation, reproductivity.*

REPRODUCTIVE PERFORMANCE OF PURE BREEDS AND CROSSBRED LANDRACE AND YORKSHIRE AND HYBRIDS OF CROSSBRED LY AND YL

Vol 107. January, 2020. Pp. 22-31

Vu Van Quang, Le Van Sang, Hoang Duc Long and Tran Phu Thanh

Corresponding author: Vu Van Quang. Tel: 0974.138.312; Email: vuquang.quang@gmail.com

To evaluation of the reproductive performance of pure breeds Landrace and Yorkshire and their hybrids, the total of 3,258 litters of them from January 2016 to June 2019 in Pig breed station 1 Gia Khanh –Binh Xuyen – Vinh Phuc was collected to analysis. The result shows that Landrace, Yorkshire, crossbred LY, and crossbred YL had good reproductive performance. The total number born (NB) reached from 11.2 to 11.91 piglets/litter, total number born alive (NBA) 10.72 to 11.47 piglets/litter, number of pig weaned (NW) 10.08 to 10.89 piglets/litter, and litter weaning weight (LWW) 63.61 to 70.14 kg. The same traits in the reproductive performance of crossbred LY and YL were higher than those of pure breeds LL, YY ($P<0.05$). Besides, the reproductive performance of pure breed LL and YY was insignificant different and this trend was similar between hybrid LY

and YL (P>0.05). Besides, the hybrid (%) in NB, NBA, NW, litter birth weight (LBW), and LWW of hybrid LY were 5.62, 6.47, 7.51, 2.75, 1.98, and 9.35%respectively higher than those of the hybrid YL. However, the survival rate and birth weight/piglet of the hybrid YL were 1.94 % and minus 2.58% higher than those of the hybrid LY. Using the LL boars as the commercial boar to mate with YY sows tended to be more effective in comparison with the inverse

Keywords: *Landrace, Yorkshire, crossbred, reproductive performance, hybrid*.

PRODUCTIVITY OF SOME CROSSBRED BEEF CATTLE IN TRA CU DISTRICT, TRA VINH PROVINCE

Vol 107. January, 2020. Pp. 32-39

Pham Van Quyen, Giang Vi Sal, Bui Ngoc Hung, Nguyen Van Tien, Nguyen Ngoc Hai, Tran Van Phong, Huynh Van Thao and Tram Thanh Hai

Corresponding author: Dr. Pham Van Quyen; Tel: 0913951554; Email: phamvanquyen.rrdc.iasvn@gmail.com

The study was conducted at farmer households and farms in Tra Cu district, Tra Vinh province from November 2015 to November 2017 to determine the productivity of some groups of beef crossbred cattle. Total of 75 F_1 crosses produced by artificial insemination using frozen semen of Red Angus, Red Brahman and Droughtmaster bulls with Sind hybrid cows, of which 15 F_1 Red Angus, 30 F_1 Red Brahman and 30 F_1 Droughtmaster. The condition of livestock production in farmer households and farms in captivity or semi-grazing, additional feed was provided in the stalls. Nutritional requirement was balanced by Ranijhan 1997 and NRC 1989.

The results showed that F_1 Red Angus, F_1 Droughtmaster and F_1 Red Brahman crosses were able to grow well in the feeding and climatic conditions in Tra Cu, Tra Vinh. Specifically, physiological parameters were within normal physiological range; proportions of tick infection, routine morbidity and culling were low; survival rate was high of calves (From 92.86 to 96.55% from birth to 12 months); The growth rate was higher than that of Sindhi crossbred and reached the weight of 254.63 kg for F_1 Red Angus; 244.31 kg for F_1 Droughtmaster and 197.29 for F_1 Red Brahman at 12 months old. Average daily gains from birth to 12 months of age were 640.54 gram/day for F_1 Red Angus; 619.04 gram/day for F_1 Droughtmaster and 492.02 gram/day for F_1 Red Brahman.

Keywords*: Crossbred beef cattle, growth, body weight, gain weight, survival rate.*

EFFECT OF SUPPLEMENTATION OF NANO-MINERALS ON GROWTH RATE AND FEED EFFICIENCY OF SOWS

Vol 107. January, 2020. Pp. 40-48

Le Van Huyen, Bui Thi Thu Huyen, Ninh Thi Huyen, Bui Thi Hong and Nguyen Hoai Chau

Corresponding author: Le Van Huyen; Tel: 0984983261. Email: huyenniah2005@gmail.com

A total of 35 sows in litter of 2-6 were used to test the effect of supplement nano mineral in different level on the reproductive performance in period of 140 days. The experiment was conducted on foreign pig farms of Ha Thai Production and Trading Joint Stock Company, Pho Yen town, Thai Nguyen province from March to August 2019. The experiment was design by one factor complete random design. Sows was allocated randomly in 5 treatments, each treatment had 7 sows, each sow was a replicate. Sows in control group were fed inorganic mineral recommended by NRC, 2012 (25 mg Mn, 80 mg Fe, 20 mg Cu, 0.15 mg Co, 0.15 mg Se and 100 mg Zn/kg feed) while sows in treatments groups were fed nano mineral with different levels of Mn, Fe, Cu, Se, Co and Fe including (10; 32; 8; 0,06; 0,06 và 40 mg); (15; 48; 12; 0,09; 0,09 và 60 mg); (20; 64; 16; 0,12; 0,12 và 80 mg); (25; 80; 20; 0,15; 0,15 và 100 mg) respectively. The result showed that (i) supplement of nano mineral reduced the mineral content in blood and live of suckling piglets compare with inorganic mineral supplement differents level of mineal in nano or inorganic form had significant impact on mineral content in blood and liver of suckling piglets (P<0.05); (ii) There were no significant differences in parameters of reproductive performance between treatments; (iii) Using nano mineral with level of 40% of NRC, 2012 recommendation still meet the mineral requirement and did not impact on reproductive performance of sows.

Keywords*: Sows; Nano mineral*

POTENTIAL OF USING PASSION FRUIT PEEL AS RUMINANT FEED

Vol 107. January, 2020. Pp. 49-58

Le Van Ha, Nguyen Hung Son, Nguyen Xuan Trach, Bui Quang Tuan and Tran Hiep

Corresponding author: Tran Hiep; Email: tranhiep@vnua.edu.vn

A study was conducted from June 2017 to October 2019, with the aim of investigating and assessing the potential of passion fruit peel in Son La province and conducting experiments of silage of passion fruit peel as feed for ruminants. Passion fruit peel collected at Tay Bac Nafoods Joint Stock Company was ensiled according to 5 formulas, as follows: CT1: 100% Passion fruit peel; CT2: Passion fruit peel with 2% molasses (wet basis); CT3: 75% passion fruit peel + 20% dried corn cob + 5% molasses (wet basis); CT4: 75% passion fruit peel + 20% bagasse + 5% molasses (wet basis); CT5: 75% passion fruit peel + 10% dried corn cob + 10% bagasse + 5% molasses (wet basis). After mixing, the raw materials were compressed layer by layer into a plastic container of 10 liters each. Each formula was ensiled in 9 containers (3 replicates and 3 periods). The quality of silage was evaluated at 30, 60 and 90 days of ensiling.

Results of silage quality after 30 days of preservation showed that the quality of all formulas was light brown, soft feed, slight sour smell and no molds. After 60 and 90 days of preservation, the silages were dark brown, soft, slight sour smell and appeared moldy on 1/3 of the surface in the formula of only passion fruit peel (CT1) or passion fruit peel with 2% molasses (CT2). The silages became sour, soft and slightly crushed, showing poor quality. Passion fruit feel with 20% bagasse and/or corn cob along with 5% molasses showed better quality, showing that silages could be stored for long period of time. The pH and organic acids showed that all ensiled formulas were stable after 1 month (pH<4.2). However, CT3, CT4 and CT5 showed better quality, allowing preservation for a long time. Thus, preserving passion fruit peel with 20% dried corn and 5% molasses or 10% dried corn cob + 10% bagasse + 5% molasses would result in a good silage quality according to sensery evaluation, pH and the chemical analysis. Both of these formulas can be used for further feeding experiments in cattle.

Keywords: *passion fruit peel, feed, ruminant.*

RESEARCH ON METABOLIZABLE ENERGY LEVEL AND CRUDE PROTEIN CONTENT IN TOTAL MIXED RATIONFOR F_1 CROSSBREEDS (BBB × LAI SIND) IN THE PERIOD FROM 6 TO 12 MONTHS OF AGE

Vol 107. January, 2020. Pp. 59-69

Cu Thi Thien Thu, Dang Thai Hai and Bui Quang Tuan

Corresponding author: Cu Thi Thien Thu. Tel: 0945692662; Email: cttthu@vnua.edu.vn.

An experiment was conducted to determine the metabolizable energy (ME) level and crude protein content in the total mixed ration (TMR) for F_1 crossbreed (BBB × lai Sind) in the period from 6 to 12 months of age. Three levels of ME and crude protein in the TMR were tested as follows: ME of 9.5 MJ/kg DM and crude protein 13% (as DM) (Group1); ME of 10 MJ/kg DM and crude protein was 14.0% (as DM) (Group2); ME of 10.5 MJ/kg DM and crude protein was 15% (as DM) (Group3). Eighteen calves (male/female ratio of 50/50) from 6 to 12 months old with equivalent body weight to each experimental group were divided into three experimental groups. The experiment was designed randomly. TMR ingredients were mixed before each feeding, fodder was chopped before mixing. Calves were given two meals a day, free drinks.

Experimental results showed that the average weight gain of the group with a crude protein ratio of 15.0% was 926.9 g/head/day, while that of the group with a crude protein ratio was 14% and 13% reached 923.1 and 863.9 g/head/day. Increasing density of ME and protein level in the diet reduced the amount of DM intake of cattle at 5 of 6 months of experiment (P<0.05). The cost of feed for 1kg ofweight increased was highest at a diet with a ME density of 9.5 MJ/kg DM, 13% crude protein, followed by a diet with a ME density of 10.5 MJ/kgDM, crude protein 15%, and lowest at a density of ME 10 MJ/kg DM, crude protein 14%.

Keywords: *Metabolizable energy, crude protein level, total mixed ration, crossbreeds beef cattle*

EVALUATION OF ECONOMIC EFFICIENCY FOR CENTURY EGG PROCESSING MODEL WITH SCALE OF 1500 CENTURY EGGS/ CACTH IN HANOI

Vol 107. January, 2020. Pp. 70-76

Lai Manh Toan, Bui Thi Kim Oanh, Nguyen Thi Hoang Anh, Hoang Thi Hanh, Nguyen Van Tan and Trinh Duy Linh

Corresponding author: Lai Manh Toan. Tel: 0968003693; Email: laimanhtoan@gmail.com

The study has conducted to evaluate the economic efficiency of century egg processing model in 3 century egg producting and trading households in Hanoi. The results show that the economic efficiency during implementing century egg processing model was very high and suitable for most of century egg processing households.

With the scale of 1.500 century eggs/catch, the total initial investment was quite low, about 51 million VND (including repairing costs, initial investment and trading registration, food safety). According to calculations, the profit of each century egg after 1 year of producing was 733 – 1.233 VND/egg (100%), the capacity of producing 126.000 eggs for a profit was at least 83 million VND. The capita recovery period was about 6-7 months. However, more importantly, the implementation of egg processing was very simple, so it can take advantage of the surplus and idle labor, create more jobs for 4 workers with income of 3.5 million/month.

Keywords: *century egg, duck egg, processing, food safety*

STUDY ON INDIVIDUALS AND SEASONS EFFECT ON SEMEN QUANTITY AND QUALITY OF CHIEM HOA BUFFALO - TUYEN QUANG

Vol 107. January, 2020. Pp. 77-88

Nguyen Hung Quang, Tran Hue Vien, Tran Thi Hoan, Ho Bich Ngoc, Dinh Thi Hong Chiem and Nguyen Van Dai

Corresponding author: Nguyen Hung Quang. Email: nguyenhungquang@tuaf.edu.vn

The study was conducted on 05 bulls selected from the Chiem Hoa Buffalo. They are raising at Animal Husbandry Reseach and Development Center for Montainuos Zone (ARDC) - Institute of Animal Husbandry. The contents of the study include: semen production ability, individual effect and the effect of seasons on some quantitative and quality production indicators. The study was conducted from June, 2018 to October, 2019. The following indicators were done: semen volume (volume of semen in an ejaculation - V, ml); pH of semen; Sperm motility (A, %); Sperm concentration (C, billion/ml); Percentage of disable spermatozoa (K,%); The percentage of live sperm (Sg %).

The results of the study showed that: Chiem Hoa buffalo bulls had good semen production ability, semen ensure the quality to produce frozen semen straws. The data in average indexs are: The amount of ejaculate semen reaches 3.10 ml/time (varies from 2.57 to 4.22 ml); Sperm motility fluctuated 71.78 - 84.12%; The sperm concentration averaged 1.07 billion/ml; The ratio of of disable spermatozoa was 11.39%; The percentage of live sperm was 83.62%. Individuals and seasons have an effect on semen quantity and quality ($P < 0.05$). The Autumn - Winter season, the buffalo semen has a higher quantity and quality than the Spring - Summer season.

Keywords: *Chiem Hoa buffalo, Semen, Sperm, Quanlity, Quatity, Season.*

UTILIZATION OF CROP BY-PRODUCT OPTIONS IN SMALLHOLDER CATTLE PRODUCTION SYSTEMS IN VIETNAM

Vol 108. February, 2020. Pp. 2-19

Tran Thi Bich Ngoc, Melanie Blanchard, Rowan Smith, Nguyen Hung Quang, Stephen Ives and Le Thi Thanh Huyen

Corresponding author: Tran Thi Bich Ngoc; Email: bichngocniah75@hotmail.com

The most common system of beef cattle production is extensive grazing system (usually 1 to 2 head) that is practiced by smallholder farmers in Northern Mountains and Central regions, accounted for 70%-80% of beef cattle in Vietnam. This system requires little labour as farmers normally do not feed their cattle with compound, concentrate or manufactured. Seasonal crop by-products, e.g. rice straw, are often used to feed cattle at night,

especially in the winter. Farmers generally use cattle for draught purposes and keep them as a source of savings. This low input system is characterised by low output and poor reproductive performance. However, to move cattle production system from extensive to semi-intensive and intensive systems, animal management, together with feed and feeding systems are needed to be solved. Based on a thorough review of the literature, it is important to understand the current animal, feed, shelter and health management practices in order to chart innovative directions and strategies for further beef cattle research and development in mountainous areas of Vietnam. Research priorities on beef cattle production should be concerned on feed, feeding and management of finishing (fattening) cattle, cow-calf production, weaned calf and pregnant cows to shift from extensive and more intensive systems.

Keywords: *Beef cattle, crop by-products, feed, smallholder farmer, extensive system, intensive system*

THE ROLE OF RUMEN CILIATE PROTOZOA IN RUMINAL FERMENTATION, DIGESTION AND ENTERIC METHANE PRODUCTION

Vol 108. February, 2020. Pp. 20-33

Nguyen Hung Son and Nguyen Thi Duong Huyen

Corresponding author: Nguyen Hung Son; Email: nhson@vnua.edu.vn. Tel: 0915064542

First decribed in 1843, rumen ciliate protozoa were considered to be important in ruminant nutrition and contributed up to 50% of the total microbial biomass in the rumen. Recent studies on the presence or absence of rumen ciliate protozoa concluded that rumen protozoa are important, but not essential in the rumen ecosystem and to the well-being of host animals. Despite the fact that elimination of rumen protozoa (defaunation) negatively affects ruminal fermentation, plant cell wall digestion, defaunation results in an increase in the efficiency of bacterial protein synthesis and the rate of nitrogen flow to the duodenum, leading to increase average daily gain of host animals. Importantly, this increase in livestock productivity could occur alongside a reduction in enteric methane emissions.

Keywords: *ciliate, defaunation, microbial protein, methane*

EFFECTS OF SUPPLEMENTATION OF VEGETABLE OIL AND TANNIN ON METHANE GAS EMISSION IN RAISING CATTLE

Vol 108. February, 2020. Pp. 34-42

Nguyen Hung Quang, Mai Anh Khoa and Chu Manh Thang

Corresponding author: Chu Manh Thang. Mobile phone: 0989126940. Email: thangslu@gmail.com

The experiments were conducted on 12 Red Sindhi crossbred cattle at 15-16 months of age for the 90-day trial in order to determine methane emission by addition of vegetable oil and tannin into feed. Cattles were housed in farm housing condition then were individually arranged to respiratory chambers to measure methane gas emissions. The diets consisted of basal diets with addition of 0.3 and 0.5% tannin; 1.5 and 3% vegetable oil on dry matter basic. Animals were fed ad libitum with 15 days of diet adaptation prior to testing. Results showed that the effect of different levels of tannin supplementation on the level of CH_4 and CO_2 emissions of experimental cattle was from 168.28 to 180.88 liters/day, there was a significant difference in the amount of methane released ($P<0.05$). Specifically, the control (without added tannin and vegetable oil) had the largest emitted methane at 180.88 liters/day and Treatment 2 (added tannin at 0.5% DM, vegetable oil at 3% DM) has the smallest methane gas emissions of 168.28 liters/day, lower than the control about 6.97%. When increasing tannin and vegetable oil supplement level, methane gas emissions tended to decrease. When supplemented with low tannin 0.3% DM and vegetable oil 1.5% DM (in Treatment 1) the amount of methane emitted was 176.05 liters/day and 125 g/day; However, when supplemented with high levels of tannin 0.5% DM and vegetable oil 3% DM the amount of methane emitted was 168.28 liters/day and 119.48 g/day. It was concluded that different tannin and vegetable oil supplements have a significant effect on the level of methane emissions of experimental cattle, as the supplement level increases, the methane emissions tend to decrease ($P<0.05$). The emission intensity of CH_4 tends to decrease with increasing dietary supplement of tannin and oil, however, when supplementation is at high level, the emission intensity tends to increase.

Use diets supplemented with 0.5% DM of tannin, 1.5% DM of vegetable oil to raise cattle for the best growth. Moreover, it has the good effect by decrease significantly methane gas emissions, contributing to reducing environmental pollution from livestock.

Keywords: *Tannin, Vegetable oil, Methane, Carbon dioxide, emission*

EFFECTS OF DIETARY PROTEIN SOURCES ON FEED AND NUTRIENT INTAKE, DIGESTIBILITY AND RUMEN PARAMETERS OF GROWING BACH THAO GOATS

Vol 108. February, 2020. Pp. 43-49

Nguyen Thi Kim Dong and Nguyen Van Thu

Corresponding author: Nguyen Thi Kim Dong; Tel: 0985868745, Email: ntkdong@ctu.edu.vn

Four Bach Thao male goats at 5 months of age (10.5±0.711 kg) were arranged in a Latin square design with 4 treatments and 4 periods to evaluate feed and nutrient takes, digestibility and rumen environment. This experiment was carried out from Feb to June 2018 at labotatory and experimental farm of Can Tho University. Four treatments were coconut meal (CM), soybean extraction meal (SEM), soya waste (SW) and *Psophocarpus scandens* (PS) corresponding to CM, SEM, SW and PS treatments, respectively. There was an adjustment for the CP intake of experimental goats, which were around 6.0 gCP/kg live weight by urea supplementation. Each experimental period last 14 days with 7 days for adaptation and then 7 days for collecting samples.

The results showed that daily DM intake was significantly different (P<0.05) among the treatments with the highest value for the PS treatment (482 g/goat/day) and the lowest for the CM one. The daily NDF intake of for the PS treatment was significantly higher (P<0.05) than the others, however daily CP intake was numerically higher (P>0.05) for the SEM (99.7g) and PS treatment (87.9g). However, the ME intake (MJ) was significantly higher (P<0.05) for the PS, SEM and SW treatment. The digestible DM and NDF were significantly different among the treatments with the higher values for the PS treatment. Numerically, the nitrogen retention was higher (P>0.05) for the SEM and PS treatment, while daily weight gain was not significantly different (P>0.05) among treatments, however the higher value for the PS treatment (120 g/day). The conclusion was that supplementing the CP sources for goats with *Psophocarpus scandens, s*oybean extraction meal and soya waste gave better feed nutrient intakes and digestibility compared to the coconut meal.

Keywords: *Small ruminants, feeds, nitrogen sources, rumen parameters, growth*

IN VITRO DIGESTIBILITY OF RICE STRAW AFTER MUSHROOM CULTIVATION AND THE UTILIZATION OF NUTRIENTS OF ENRICHED RICE STRAW BY RED SINDHI CROSSBRED CATTLE

Vol 108. February, 2020. Pp. 50-55

Nguyen Thi Kim Dong and Nguyen Van Thu

Corresponding author: Nguyen Thi Kim Dong; Tel: 0985868745, Email: ntkdong@ctu.edu.vn

Two experiments were carried out from Feb to Aug, 2017 at the laboratory and the experimental farm of Can Tho University to investigate nutrient contents and *in vitro* digestibility values of rice straw after it's use to cultivate mushrooms and to evaluate the effect of rice straw enriched by urea, molasses and minerals on *in vivo* digestibility and nutrient intake of cattle. In Experiment 1 a complete randomised design was used for the *in sacco* evaluation of rice straw at three stages: initial (R), at 20 days treated with water (RW20) and after harvesting mushrooms (MS). There were 8 replicates of each treatment. Faeces of a Murrah buffalo were used as inoculant. In Experiment 2, four Red Sindhi crossbred cattle (138 ± 12 kg) were allocated in a 4 x 4 Latin Square design to four diets, which included rice straw (R), rice straw plus urea-molasses-mineral mixture (RS+UMM), urea-treated rice straw (URS) and urea-treated rice straw plus molasses-mineral mixture (URS+MM). The crude protein and ash in MS was higher and NDF lower than in R and RW20. *In vitro* digestibility values at 24 h were similar but were lower for MS at 96 h.The MS after drying was dark, dusty and had a bad smell and was not palatable to cattle. In Experiment 2, adding urea, molasses and minerals to rice straw, or molasses and minerals to urea-treated rice straw, increased intake, DM *in vivo* digestibility and N retention.

Keywords: *Cattle, rice straw, mushrooms, digestibility, intake*

A RESPONSE OF REPRODUCTIVITY OF CROSSBRED RABBITS TO DIETARY CRUDE PROTEIN LEVELS FROM CONCENTRATE AND WATER SPINACH LEAVES IN THE MEKONG DELTA OF VIETNAM

Vol 108. February, 2020. Pp. 56-62

Nguyen Van Thu

Corresponding author: Nguyen Van Thu; Email: nvthu@ctu.edu.vn

Twenty five rabbit does were arranged in a completely randomized design with 5 treatments and 5 replications to evaluate the reproductive performance of crossbred rabbits (New Zealand x Local rabbits) fed 5 levels of crude protein (CP) including 30, 32, 34, 36 and 38 g CP/doe/day corresponding to the CP30, CP32, CP34, CP36 and CP38 treatments. The crude protein supplementation in diets was from water spinach leaves and concentrate with Para grass (*Brachiaria mutica*) as a basal diet. The experiment was carried out at the experimental farm of Can Tho University from May to Sep, 2017.

The results showed that litter size at birth, weight of litter at birth, number of rabbit at weaning, weight of rabbit at weaning in litter1 enhanced with increasing of CP in the diets, the higher values were found for the treatments of 36 and 38 g CP/doe/day (P>0.05). The growth rate of pregnant doe and milk production (g/doe/day) of experimental rabbits increased with increasing of CP levels in the diets and the values were higher for the treatments of 36 and 38 g CP/doe/day (P<0.05). In litter 2, the results showed that litter size at birth, weight of litter at birth, number of rabbit at weaning, weight of rabbit at weaning improved with increasing of CP levels in the diets (P<0.05). The milk production (g/doe/day) increased with increasing of CP levels in the diets (P<0.05), the higher values for the treatments of 36 and 38 g CP/doe/day. It was concluded that the higher reproductive performance of crossbred rabbits in two litters were found in the treatments of 36 and 38g CP/doe/day.

Keywords*: crossbred rabbit, crude protein, para grass, reproductive performance, water spinach*

IN VIVO GREENHOUSE GASES EMISSIONS, NUTRIENT INTAKE, DIGESTIBILITY AND RUMEN PARAMETERS OF GROWING SHEEP AFFECTED BY DIETARY SILAGE SOURCES

Vol 108. February, 2020. Pp. 63-72

Nguyen Van Thu

Corresponding author: Nguyen Van Thu; Email: nvthu@ctu.edu.vn

This experiment was done to evaluate *in vivo* greenhouse gases production, nutrient utilization and rumen parameters affected by silages in diets of sheep from Feb to May, 2018 at Can Tho University farm. Four male sheep with average live weight of 17,3±1,48 kg were arranged in a 4x4 Latin square design with 4 treatments including (1) *Paspalumatratum* (PA), and (2) 40% *Pennisetumpurpureum* silage (PPS40), (3) 40% *Operculinaturpethum* silage (OTS40) and (4) 40% *Psophocarpusscandens* silage (PSS40) replacing *Paspalumatratum* (%DM) in the diets. Methane and carbon dioxide were measured by using the chambers for 2 continuous days and analyzed by a Greenhouse Gas Analyser (USA). The results showed that the CH_4 production (g/kg OM intake) of sheep was significantly different among the treatments (P<0.05). The CH_4 production (g/kg OM intake) of the OTS40 treatment (6.37) was the lowest, following by the PSS40 treatment (6.93), the PPS40 treatment (7.69), and the PA treatment (9.60). The metabolizable energy (ME) intake was improved by the silage diets (P=0.056), while digestible protein intake and nitrogen retention of the OTS40, PSS40 PPS40 treatments tended to be higher than that of the PA treatment (P>0.05). Daily weight gains (g/day) of sheep were likely to be higher (P>0.05) for the OTS40, PPS40 and PSS40 treatments. The conclusion was that replacing *Paspalumatratum* grass by PPS, OTS or PSS at level of 40% (DM) in diets reduced CH_4 output, tented to improve total DM intake, crude protein digestibility, rumen parameters and nitrogen retention and reduced CH_4 output of growing sheep.

Keywords: *methane, nitrogen retention, nutrient digestibility, sheep, silage*.

A RESPONSE OF NUTRIENT UTILIZATION, DIGESTIBILITY AND DAILY WEIGHT GAIN OF CROSSBRED CATTLE (BLACK ANGUS × ZEBU) FROM 13-15 MONTHS OF AGE TO DIETARY CONCENTRATE SUPPLEMENTION

Vol 108. February, 2020. Pp. 73-80

Nguyen Binh Truong and Nguyen Van Thu

Corresponding author: Nguyen Binh Truong; Mobile phone: 0983377424; Email: nbtruong@agu.edu.vn

A Latin square design experiment of concentrate supplementation with 5 treatments and 5 cattle (Black Angus × Zebu) of 223±16.7 kg aiming to find the optimum nutrient utilization and daily weight gain (DWG) was conducted. The experiment was carried out at Sau Duc cattle farm, which was located at Vinh Gia commune, Tri Ton district of An Giang province and the laboratory E205 of Department of Animal Science, College of Argiculture of Can Tho University from December 2018 to April 2019. The treatments were 0, 0.5, 1.0, 1.5 and 2.0 kg concentrate supplemented per head per day corresponding to C0, C0.5, C1.0, C1.5 and C2.0 treatments. One experimental period lasted 14 days with 7 days for adaptation and 7 days for sampling. Fresh elephant grass was fed at the fixed level of 5 kg/head/day (in fresh), while rice straw was fed *ad libitum* for all treatments. The results showed that total DM intake was significantly different (P<0.05) among treatments with the higher values for the concentrated suppmentation treatments. The ME intake of C2.0 treatment (52.0 MJ/head/day) was slightly higher (P>0.05) than that of C1.5 treatment (49.2 MJ/head/day) but it was significantly higher (P<0.05) compare to C1.0, C0.5 and C0 treatments (43.4, 39.2 and 34.6 MJ/head/day, respectively). DM and OM digestibility (%) were significantly different (P<0.05) among the treatments with the highest values for the C2.0 treatment. It was also showed that when increasing the level of concentrate supplementation, it improved the CP digestibility from 54.1% to 71.9%. Daily weight gain of experimental cattle was significantly different (P<0.05) among treatments and it was 153, 292, 438, 536 and 557 g/day for the C0, C0.5, C1.0, C1.5 and C2.0 treatments. The feed cost (VND per day) for experimental cattle increased by increasing supplemental levels of concentrate, however the feed cost per kgDWG was lower for the C1.0 and C1.5 treatments (38.4 and 38.2 thousand VND/kg, respectively). The conclusion was that increasing concentrate levels in beef cattle diets from 0 to 2.0 kg was gradually improved nutrient intake, digestibility and daily weight gain. For the beef crossbred cattle (Black Angus × Zebu), concentrate supplementation level from 1.0 to 1.5 kg per day in diets could be properly recommended for farmers' practice in term of feed utilization and economic return.

Keywords: *Ruminants, nutrient utilization, digestion, feed conversion, growth.*

PERFORMANCE OF CO AND MEO PIGS IN MULTIPLICATION HERDS

Vol 109. March, 2020. Pp. 2-12

Hoang Thi Phi Phuong, Pham Sy Tiep, Ngo Mau Dung, Phung Thang Long, Thai Khac Thanh, Bui Duy Hung, Do Thi Nga and Ngo Thi Kim Cuc

Corresponding author: Hoang Thi Phi Phuong. Tel: 0988133841. Email: loanphuong65@gmail.com

This study was conducted at the models of the Research and Development Institute - Hue University of Agriculture and Forestry (for Co pigs) and Nghe An Breeding Center (for Meo pigs) in 2018 - 2019 to evaluate the reproductive and growth performance of Co and Meo pig herds as a basis for increasing productivity and replication of these 2 pig breeds in Central provinces. Experiment I was conducted on a total of 120 Co sows and 120 Meo sows (60 of each breed in 2018 and 60 of each breed in 2019). Experiment II studied on 60 Co pigs (30 young boars + 30 gilts) and 60 Meo pigs (30 young boars + 30 gilts). Each breed, the pigs were kept together in 3 treatments (equivalent to 3 replicates), each treatment has 10 pigs of equal age, weight, housing conditions, veterinary and nurturing. When the pig are 8 months old, we recorded the final weight and back fat at point P2.

The results showed that the Co and Meo pig herds had their first estrous age at 220.12 and 211.16 days, their first mating age was 249.33 and 242.66 days, their first farrowing age was 361.25 and 356.58 days. The average weight of first mating ranged from 39.15 to 42.62 kg. The number of newborns/litter reached 7.45 to 7.51 piglets; the number of weaned pigs per litter was from 6.67 to 6.83; weaning weight/litter reached from 36.35 - 39.68 kg. The Co and Meo pigs weighed 38.97 to 42.52 kg at 8 months old. The average thickness of back fat at P2 was 12.47 - 12.59 mm. Average daily gain (ADG) during the period of 2 - 8 months old were from 186.19 to 203.72 g/head/day and the young boars always had higher ADG than gilts from 3.02% to 8.48%.

Keywords: *Performance, growth, Co pig, Meo pig.*

GENETIC PARAMETERS AND GENETIC TREND OF BODY WEIGHT, BODY LENGTH AND CHEST GIRTH TRAITS ON DUCK LINE V22

Vol 109. March, 2020. Pp. 13-18

Le Thanh Hai, Duong Xuan Tuyen and Ho Van The

Corresponding author: PhD. Le Thanh Hai. Tel: 0918.567547, Email: haivigova@yahoo.com.vn

Data of 3.913 ducks of V22 meat-type line selected to stabilize body weight through 4 generations from the year 2016 – 2019 at VIGOVA duck breeding farms were analyzed to evaluate the genetic ability, phenotypic and genetic trend of body weight, body length and chest girth at 7 weeks of age for selection purpose. Genetic parameters were estimated by using REML in VCE6.0.2 with multiple trait animal model. Breeding values were estimated by using BLUP method in PEST 4.2.3 with multiple trait animal model. Genetic and phenotypic trends were analyzed by linear regression on Excel 2016 software. Heritability coefficients of body weight, body length and chest girth at 7 weeks of age were 0.43, 0.33 and 0.33 respectively. Correlations between the three traits were all positive. The genetic correlation (r_G) between body weight and body length was 0.59, between body weight and chest girth was 0.75 and between body length and chest girth was 0.71. The genetic trend showed the result of selection to stablize the body weight at 7 weeks of age of V22 line ducks as the average increase of body weight was 5.84 g per generation.

Key words: *Selection, meat-type duck, genetic parameter, genetic trend.*

EFFECTS OF IRON SUPPLEMENTS ON CO AND MEO SUCKLING PIGLETS

Vol 109. March, 2020. Pp. 19-25

Pham Sy Tiep, Hoang Thi Phi Phuong, Pham Duy Pham, Pham Hai Ninh, Nguyen Van Trung, Ngo Mau Dung, Phung Thang Long, Thai Khac Thanh, Bui Duy Hung and Chu Manh Thang

Corresponding author: Pham Sy Tiep. Tel: 0913506505. Email: phamsytiep@gmail.com

The study was conducted at the Research and Development Institute - Hue University of Agriculture and Forestry (for Co pig) and Nghe An Breeding Center (for Meo pig) in 2018 to determine the effectiveness of the iron supplement for suckling piglets on Co and Meo breeds. The experiment was conducted on a total of 24 litters Co piglet and 24 litters Meo piglet, ensuring uniformity in the number of pigs/litter, birth weight/litter. The sow herd was selected as second to fourth litter, ensuring uniformity in breed, age and reproductive performance across parities. The sows in both lots got the same vaccines. The piglets of each breed were randomly chosen and divided into 2 lots: in experimental lot, piglets received iron supplement, and control lot - piglets without iron supplement. Each lot has 12 litters, each litter is a repetition. Observation time starts from birth and ends when pigs are 50 days old (weaning). The quality of care follow techniques of breeding endogenous pigs and current regulations of veterinary medicine in disease prevention.

The results showed that iron supplementation for Co and Meo piglets during suckling period contributed to the increase in the number of weaning pigs/litter from 7.17 to 17.99%; increase weaning weight/piglet to 5.67 - 7.54%; increase weaning/litter weight to 13.23 - 26.91%; reduce diarrhea incidence to 8.27 - 8.68%; reduced about 7.51 - 12.9% in piglet mortality until weaning, compared piglets without iron supplement.

Keywords: *Iron supplementation, suckling piglets, weaning weight, Co pigs, Meo pigs.*

EFFECTS OF PROBIOTICS SUPPLEMENTED ON DIETS ON PERFORMANCE OF CROSSBRED NOI BROILERS FROM 2 TO 10 WEEKS OLD

Vol 109. March, 2020. Pp. 26-34

Lam Thai Hung and Ly Thi Thu Lan

Corresponding author: Dr. Lam Thai Hùng, Email: lthung@tvu.edu.vn; Tel: 0919 026614

A total of 120 crossbred Noi chickens (male Binh Dinh x female Noi) at two weeks old were allotted in a completely randomized design of four treatments and three replicates (10 broilers for each) to identify effects of probiotics added on diets on bodyweight gain and feed conversion ratio (FCR). The trial was conducted at animal and veterinary experimental farm, Tra Vinh University, from December 2018 to June 2019. Probiotics was supplemented at four levels on diets including 0% (control), 0.1%, 0.2%, and 0.3% for birds on 2-5 and 6-10

weeks of age. Experimental feed was concentrate, which was produced by a feedstuff company. Birds were fed, given fresh water *ad libitum*, and prevented common diseases. Birds were reared on floor by zinc net on 2-5 weeks old and on biology floor on 6-10 weeks old. The result showed that supplementation of probiotics at levels 0.1%, 0.2%, and 0.3% on diets of crossbred Noi from 2 to 10 weeks of age did not affect on feed intake. However, bodyweight gain of crossbred Noi chickens increased from 14.86 and 15.7 g/bird/day up to 17.5 and 18.49 g/bird/day and FCR was improved from 2.79 and 2.65 to 2.38 and 2.26 when probiotics supplemented at levels from 0% and 0.1% up to 0.2% and 0.3%.

Keywords*: corssbred Noi chicken, probiotics, growth, FCR.*

EFFICACY OF ARTIFICIAL INSEMINATION FOR BRAHMAN HERDS IMPORTED FROM AUSTRALIA BY FROZEN SEMEN OF BLANC BLUE BELGE, CHAROLAIS AND RED ANGUS COWS IN M'DRAK DISTRICT, DAK LAK PROVINCE

Vol 109. March, 2020. Pp. 35-42

Dang Thai Nhi, Nguyen Trung Hieu, Nguyen Van Hanh, Quan Xuan Huu and Le Van Ty

Corresponding author: Nguyen Van Hanh, Tel: 0985255047 – Email: nvhanh@ibt.ac.vn

Insemenation of imported Blanc Blue Belge (BBB), Charolais (CHA), Red Angus (RA) and Red Brahman (BRA) freezing semens in to Australian Red Brahman cows, rised and well adapted in M'Drak showed hight rate of successful pregnancy: 76.9%; 75.8%, 80.2% và 75.3% respectly. Only 13.1%; 6.0%; 14.8% cases of giving birth of crossed Blanc Blue Belge, Charolais and Red Angus calves need assisted in comparison with 14.7% cases of Brahman × Brahman; Rate of placental retention was in the range 5.9%; 8.0%; 15.5% in comparison 9.2% in case of BRA × BRA; Living caves along period from birth to taking of from mother was 92.8% - 95.3% and no cow was death at giving birth of calf. The average weigh of new born crossed caves F1 of BBB, F1 of CHA, F1 of RA were: 32.9 kg ($p<0.01$); 35.4 kg ($p<0.01$); 29.6 kg in comparison with 27.1 kg for BRA × BRA calf and the average body weigh this ones at age 6 months were 242.0 kg ($p<0.01$) (F1 BBB); 240.2 kg ($p<0.01$) (F1 Charolais); 226.0 kg (F1 Red Angus) vs 215.0 kg (BRA × BRA) showed hight efficiency of crossed with BBB, CHA, and RA in body weigh.

Keywords: *Artificial insemination; Semen of Blanc Blue Belge cattle; Semen of Charolais Cattle; Semen of Red Angus Cattle; Rate of pregnancy; Average weigh.*

PREVALENCE OF GASTROINTESTINAL NEMATODES INFECTION OF CROSS-BRED SIND CATTLE AND EFFICACY OF ANTHELMINTICS IN TRA VINH PROVINCE

Vol 109. March, 2020. Pp. 43-50

Nguyen Thi Kim Quyen, Truong Viet Tien, Nguyen Van Vui and Truong Van Hieu

Corresponding author: Nguyen Thi Kim Quyen, Tel: 0355.346.504. Email: quyen@tvu.edu.vn

The study was conducted to determine the prevalence of gastrointestinal nematodes infection of cattle and efficacy of anthelmintics in different regions of Tra Vinh province including Cau Ngang, Chau Thanh, and Tra Cu districts from 01 April 2019 to 30 December 2019. A total of 450 fecal samples from cattle was examined for gastrointestinal nematodiasis. Overall, the prevalence of gastrointestinal nematodes infection of cattle was found to be 43.8% from fecal samples by using floatation technique. The results of classification and identification of these parasites by using classical parasitological techniques showed that almost cattle in those regions of this study were infected by *Heamonchus contortus* (28.4%), *Trichocephalus ovis* (20.4%), and *Toxocara vitulorum* (6.0%). In addition, by the necropsied method, the infection of these parasites in cattle was 55.6%. This infection rate was also parallel increase in the age of animals with 25.0% (under 1 year), 58.3% (1 to 2 years), and 83.3% (over 2 years). Moreover, *H. contortus*, *T. ovis*, and *T.vitulorum* were also found in this method. Albendazole and Fenbendazole were used as oral anthelmintic drugs to deworm these parasites. The results presented that all of drugs were safe and have no side effects to animals during treating. Notably, Albendazole (100 mg or 150 mg/12 kg body weight) and Fenbendazole (100 mg/13 kg or 20 kg body weight) were the most effective with 100% of deworming.

Keywords: *gastrointestinal nematode, Tra Vinh province, prevalence, cross-bred Sind, anthelmintic efficacy*

PREVALENCE OF *YERSINIA ENTEROCOLITICA* ISOLATED FROM PIGS IN SLAUGHTERHOUSES IN HANOI

Vol 109. March, 2020. Pp. 51-59

Luu Quynh Huong, Tran Thi Thu Hang, Hoang Minh Duc, Nguyen Thi Thanh Huyen and Nguyen Thi Thu Hang

Corresponding author: Luu Quynh Huong, Tel: 0914649774, Email: lqhuongvet@gmail.com

Yersinia enterocolitica is a common foodborne pathogen following *Campylobacter* and *Salmonella*. *Yersinia enterocolitica* is frequently harbored by healthy pigs which have been identified as a major reservoir of the human pathogenic strains. The aim of this study is to identify the prevalence and to characterize pathogenic *Yersinia enterocolitica* strains isolated from tongue swab, tonsil, feces, and pork meat samples collected from pigs in slaughterhouse in Hanoi, Vietnam. A total of 120 samples collected from 30 pigs in slaughterhouses were examined for *Yersinia enterocolitica* contamination following ISO 10273 -2003. The prevalence of *Yersinia enterocolitica* was 23.33% in feces samples; 20% in pork meat samples; 13.33% in tongue swab samples and 10% in tonsil samples. Of the 20 isolated strains, 5 strains were the pathogenic strains of biotype 1B (25%); 6 strains were the pathogenic strains of biotype 4 (30%) and 9 strains were the non-pathogenic strains of biotype 1A (45%). This study showed that *Yersinia enterocolitica* serotype O:5 is the most popular serotype in pig.

Keywords: *Pig, Yersinia enterocolitica, slaughterhouse, Ha Noi*

ASSESSING THE SOURCE OF TEA BY-PRODUCTS AS SUPPLEMENTARY FEED IN CATTLE PRODUCTION

Vol 109. March, 2020. Pp. 60-72

Le Tuan An, Chu Manh Thang, Pham Kim Cuong and Tran Hiep

Corresponding author: Chu Manh Thang; Tel: 0989126940; Email: thangslu@gmail.com

Conducting tea sampling surveys in three provinces with relatively large tea growing areas of the country are Thai Nguyen, Bac Kan and Phu Tho. For each province, select 03 districts with large tea growing areas in three regions with specific climate of each province then select three communes per districts, choose 3 villages per communes, select households/villages to get Tea samples are based on the following criteria: (i) 10% number of households had area of <10 sao (one sao equal to 360 m^2); (ii) 10% number of households had area of from 10 to 100 sao accounted for 10% and (iii)10% number of households had area of> 100 sao. The harvested tea samples must be processed by manual methods and industrial machines. The monitoring indicators include: (i) Tea varieties, productivity, processing methods, types of by-products and number of by-products; (ii) Chemical composition and nutritional value of tea by-products; (iii) Influence on tea variety, locality, crop, amount of by-products and nutritional characteristics of tea by-products. The results show that: The output of dried tea by-products in the three provinces estimated at 9.6 thousand tons/year, equivalent to 11.49% of the total amount of dried tea. Thai Nguyen has the largest amount of by-products, followed by Phu Tho and Bac Kan with 4.8; 4.0 and 0.8 thousand tons. The method of processing by industrial machine will give tea with the rate of tea by-products also lower than the traditional manual method 8.28 compared to 17.81%. The parametters of CP, NDF and tannin of the surveyed tea varieties ranged from 16.7-19.9 respectively; 26.5-28.2 and 27.1-29.8% dry matter.

Keywords: *Dry tea by-products, additional food, raising cows*

EVALUATION OF BALANCE AND POSSIBILITY OF LARGE CATTLE DEVELOPMENT ON THE BASIS OF ROUGHAGE SOURCES OF GIA LAI PROVINCE

Vol 109. March, 2020. Pp. 73-84

Vu Anh Tai, Bui Quang Tuan, Tran Thi Thuy Van and Le Duc Hoang

Corresponding author: Bui Quang Tuan. Tel: 0915176042. Email:bqtuan@vnua.edu.vn

This research was conducted in Gia Lai province from 12/2017 to 12/2019 to evaluate balance and possibility of large cattle development on the basis of local roughage sources. After 3 years of research, application of methods both in geography, botanical, ecological and animal sciences, the relationship between ruminant production and roughage sources has been reviewed in this paper. The results of the study identify the local sources of roughage for cattle in Gia Lai including natural grass, cultivated grass and agricultural by-products; The total amount of current roughages is generally sufficient to meet the needs of the large cattle herds but is not seasonal. There are

many localities where lack of roughage, the most serious are Pleiku, An Khe, Chu Puh, Duc Co and Chu Se, to be safe when the hot and dry season lasts, these localities have to reduce the number of large cattle herds or take measures to reserve roughage, develop forage grass production, apply technical measures in processing and preserving of roughage for cattle. Even when using all cultivated grass resources, the risk of lack of roughage during the long hot dry season is still quite high in An Khe, Ia Grai, Ia Pa and Krong Pa, and if only using all resources of the easy-to-use agricultural by-products, localities with high risk of lack of roughage are still at risk: Pleiku, Duc Co, Ia Grai, Krong Pa, Chu Puh, Chu Se, or they can only meet the level of near enough. like An Khe and Mang Yang. Only when they use all most of the agricultural by-products combined with cultivated grass will these localities ensure the safety of roughage for large cattle herds in the long dry seasons. Only K'Bang and Phu Thien can provide enough roughage and be able to develop the best cattle herds.

Keywords: *Natural grass, pasture, cultivated grass, agricultural by-products*

FACTORS AFFECTING PRODUCTIVITY AND QUALITY IN FORAGES PRODUCTION FOR CATTLE

Vol 110. April, 2020. Pp. 2-16

Nguyen Van Quang

Corresponding author: Nguyen Van Quang. Tel: 0989637328. Email: quangvcn@gmail.com

In ruminant husbandry, forages is an indispensable need in the daily diet. To ensure the active source of forage for the development of grazing cattle, two solutions should be implemented: planting and processing forages reserves. In the solution of growing forages crops, in addition to allocating a certain area for intensive cultivation, the thorough exploitation of other areas to grow grass for animal husbandry is very meaningful and easy to be adopted by farmers accept. In addition to utilizing agricultural by products, the planting of forages crops helps farmers be more active in their production process. Based on the quantity and quality of forages sources, it is possible to make plans to increase herds, improve livestock productivity, and bring higher economic efficiency. Currently, many varieties of forages crops have been researched and selected to suit different ecological regions, giving farmers many options to organize the production of forages for cattle. However, in fact the forages varieties when planted are affected by many objective and subjective factors that affect the productivity and quality of forages crops such as: climate (light, temperature, humidity); Soil nutrition; like; cutting time; original height after cutting; season. By grasping these impact factors, in the process of producing food for cattle, farmers choose the most appropriate solutions to promote the potential of each breed, improve productivity, the quality of forage provides better animal husbandry.

Keywords: *Productivity, quality, crop, soil nutrition*

SELECTIVELY STABILIZING PRODUCTIVITY OF THE SUPER MEAT 4 CT DUCK LINES

Vol 110. April, 2020. Pp. 17-30

Vu Duc Canh, Pham Thuy Linh, Nguyen Quy Khiem, Nguyen Ngoc Dung, Nguyen Thi Nga, Tran Thi Thu Hang, Pham Thi Xuan, Khuat Thi Tuyen, Hoang Dinh Truong, Phung Duy Do and Luu Thi Thuy

Corresponding author: Vu Duc Canh; Tel: 0915.135.458; Email: giacamthuyphuong@gmail.com; Website: giacamthuyphuong.vn

The objective of this research was selected stabilize of the 4 CT duck lines, applying a selection method based on the breeding value combined with the selection index. Results after 3 selective generations: The CT1 duck line has a body weight of 7 weeks of male ducks reaching 3392.20g, females reaching 3253.28g, the genetic coefficient of the body weight traits of 7 weeks of age is 0.46, the genetic progress achieved in the male duck was 28.16g / generation, in the female duck was 20.43g / generation, the egg yield / 42 weeks of laying reached 186.35 eggs, the embryo ratio reached 89.74%, the rate of hatching / total eggs with embryos reached 81.52%. CT2 duck line has a body weight of 7 weeks old male reached 3279.64g, female duck reached 3071.26g, genetic coefficient of body weight traits of 7 weeks old was 0.42, genetic progress achieved in male ducks is 23.98g / generation, in female ducks is 18.16g / generation, egg production / 42 weeks laying reaches 191.21 eggs, embryo rate reaches 90.20%, hatching rate / total eggs embryos reached 81.83%. The CT3 duck line has egg yield / 42 weeks of laying to reach 207.40 eggs, the genetic coefficient of the egg yield trait of 20 weeks of laying is 0.22, the genetic progress achieved is 0.375 eggs / generation. CT4 duck line has egg yield / 42 weeks of laying to 217.52 eggs, the genetic coefficient for egg yield traits of 20 weeks of laying was 0.24, genetic progress was 0.665 eggs / generation.

Keywords*: Choose stability; Selection index, Specialized meat ducks*

EFFECTS OF PROBIOTIC ACTISAF BIOPRODUCT ON THE REPRODUCTION OF DUCKS STAR 53

Vol 110. April, 2020. Pp. 31-40

Tran Duc Hoan, Nguyen Van Hieu, Nguyen Thi Khanh Linh and Nguyen Viet Duc

Corresponding author: Tran Duc Hoan. Tel: 0965679819; Email: hoantd@bafu.edu.vn

The study aimed to evaluate the effects of Actisaf product (*Saccharomyces cerevisiae* sc 47) supplemented on egg yield and egg quanlity of layer Star 53 ducks. The study was carried out from August, 2019 to February, 2020 at the duck farm of Hai Thinh feed joint stock company, Quang Yen town branch, Quang Ninh province. In this experiment, 600 ducks were devided into two groups (experimental group supplemented bioproduct Probiotic Actisaf with the rate of 0.5g/kg feed and control group not used), with 3 replicates and 100 ducks/replicate. The results demonstrated that, the average of egg yield per laying duck in experimental group was higher 48.85 eggs/week/240 ducks as compare to control group, the rate of egg-lay in experimental group showed higher 2.90%. The average of egg weight in experimental group was 76.46 g/egg, whereas 74.80 g/egg in control group. The rate of egg shell, egg yolk in experimental group also showed higher than control group, while egg-thick and egg shaped between two groups showed no different significance (*p>0.01)*. Feed conversion ratio/10 eggs in experimental group reduced 0.39kg as compare with control group. The rate of embryo and hatching in experimental group showed higher than in control group. In conclusion, supplementation of Actisaf product showed good effiency in increasing of egg yield, rate of egg shell, rate of egg yolk, embryo and hatching, contributed in improvement of egg production and egg quality in layer ducks.

Keywords: *Actisaf, quanlity, yield, Star 53, eggs, ducks*

EFFECTS OF LACTOZYM SUPPLEMENTATION ON GROWTH PERFOMANCE, PRODUCTIVITY AND QUALITY OF MEAT IN CHICKENS

Vol 110. April, 2020. Pp. 41-54

Tran Duc Hoan, Pham Thi Quyen, Nguyen Van Luu and Nguyen Thi Khanh Linh

Corresponding author: Tran Duc Hoan; Tel: 0965679819; Email: hoantd@bafu.edu.vn

This study aimed to evaluate the effects of Lactozym on growth performance, productivity, quality of chicken meat and feed conversion ratio. We carried out study from August, 2019 to February, 2020 at the households in Hoang An commune, Hiep Hoa district, Bac Giang province. 900 chickens were seperated into two groups (chickens in the experimental group were supplemented Lactozym in case of the control group not supplemented; 450 chicks per group). The results showed that, an increase in average body weight gain of the chickens from 4 to 16 week-age; the average body weight gains of the chickens in the experimetal group (supplemented Lactozym) and the control group were 1156.82 and 1059.22g/chick, respectively. The absolute growth and relative growth rate in chickens supplemented with probiotic showed different from 4-5 to 11-12 week- age significantly ($P < 0.05$). The feed conversion ratio of chickens in the experimental group reduced 2.94kg, where as 3.12kg in control group. The product still increased the carcass ratio, thing meat ratio, breast eat ratio and reduced the belly fat ratio. Chicken meats supplemented probiotic showed higher pH and bright light rate of meat, the dehyration rate of meat was lower, meat was softer as compare with control group. These results can be considered as a fundament for application of Lactozym to improve the productivity in poultry production.

Keywords: *Quality, chicken, Lactozym, productivity, growth performance*

THE EFFECTS OF VITAMIN E SUPPLEMENTATION ON PHU THO MULTI-SPUR CHICKEN SEMEN QUALITY DURING LIQUID STORAGE

Vol 110. April, 2020. Pp. 55-64

Bui Thi Hoang Yen, Dang Hoang Lam and Nguyen Thi Ha Phuong

Corresponding author: Bui Thi Hoang Yen. Tel: 0916.473.376; Email: hoangyen.vp@gmail.com.vn

The current study investigated the effects of vitamin E supplementation on chicken semen up to 48 h in liquid storage. Pooled semen was divided into control and treatment groups with the adding of different concentration of vitamin E. The motility (mass activity, progressive motility), viability and abnormality of sperm were tested at 0 h, 24 h, and 48 h of storage. The results of the experiment showed that the motility of stored sperm was increased by the addition of 9 µg of vitamin E per mL extender after 24 h (7.5% mass activity and 11.28%

progressive motility) and 48 h (23% mass activity and 28.32% progressive motility). The viability of sperm also was improved by adding vitamin E at the same concentration after 24 h (significantly) and 48 h (tendency) of storage (3.5% and 2.5% higher than viability. However, there was no significant difference in the abnormality of sperm between the control and treatment groups. After storage 24 h, the fertility of stored sperm was not different between the control and treatment groups in the first week after insemination. In the second week, the fertility of semen was highest by the addition of 9 µg/mL vitamin E ($P<0.05$) . Until 48 h of storage, the fertility was higher in the treatment group with 9 µg/mL vitamin E addition (62.15% in 1st week after insemination and 45.76% in 2nd week after insemination) compared to control group (35.27% and 11.68%, respectively). In conclusion, the addition of vitamin E to extender improved the motility, viability, and fertility of chicken sperm during liquid preservation and the optimum concentration was 9 µg per mL extender.

Keywords: *Phu Tho multispur chicken, semen, liquid storage, vitamin E, antioxidant*

APPLICATION OF ARTIFICIAL INSEMINATION TECHNOLOGY TO DEVELOP MURRAH HYBRID BUFFALO HERD IN VINH PHUC

Vol 110. April, 2020. Pp. 65-74

Nguyen Duc Chuyen, Nguyen Van Dai, Nguyen Huy Huan, Luu Van Huong and Ha Van Quyet

Corresponding author: Nguyen Duc Chuyen, Mobile: 0944 758 797; Email: nguyenducchuyen@gmail.com

Application artificial insemination to develop the F_1 Murrah buffalo herd in Vinh Phuc province from 2016-2018. The study on investigation to select the growth and reproductive ability of buffalo herd in Tam Dao and Lap Thach district of Vinh Phuc province showed that the body weight of female buffalo at 6 year of age is 382.63 and 391.38 kg; first mating age 34.72 and 35.63 months; the distance between two litters 17.68 and 16.89 months. Using 310 Murrah buffalo straw semen inseminated for 240 female buffaloe in two districts. There are 153 pregnant buffaloes. The pregnancy rate was 49.35%. 2.03 straw semmen were used for a pregnant buffalo. The distance between two litters is lower compared to investigated buffaloes in the area. F_1 hybrid buffaloe born with the AI method has a good growth in farmer conditions. The birth weight of male F_1 hybrid buffaloe is 29.71 kg and 28.58 kg with female. At 12 months old the male F_1 hybrid buffaloe reached 186.58 kg and the female reached 184.75 kg. At 18 months old the male F_1 hybrid buffaloe reached 240.19 kg and the female reached 239.93 kg. The growth ability of bybrid buffalo to 18 months of age is higher than local buffalo from 12.5% - 20.7%.

Keywords: *Murrah semen straw, F_1 hybrid buffaloe, artificial insemination, Growing*.

CURRENT STATUS OF GOAT PRODUCTION IN TRA VINH PROVINCE

Vol 110. April, 2020. Pp. 75-84

Truong Van Hieu, Huynh Van Tuan, Nguyen Thi Kim Quyen and Ho Quoc Dat

Corresponding author: Dr. Truong Van Hieu; Tel: 0919.375.328; Email: vanhieu@tvu.edu.vn

A survey was conducted to evaluate the present situation and economic efficiency of goat production systems in Tra Vinh province including Chau Thanh, Cau Ngang, and Duyen Hai districts from October to December 2019. The study was conducted using the Rapid rural appraisal method (RRA). The results showed that over 45 surveyed goat farms were the combination of animal breeding and meat production systems. The total number of goats in this survey was 833 heads (18.5 heads/household) with (BT × Co), Bach Thao (BT) and (Boer × BT) breeds were 1.82%, 25.7% and 72.5%, respectively. Almost goat farms with a simple housing and animal in captive were 73.3%. In addition, the daily diets consisted of fresh grasses (61.5%), fresh leaves (29.0%), and mixed feed (9.5%). The goats were injected vaccines (26.7%) and dewormed (44.4%). Furthermore, the results of health management presented that there were some common diseases in goats such as mouth ulcers, eye inflammation, external parasites and pneumonia. Moreover, the profit margin ratio of farmers from goat production was 1.36. The households have three main difficulties as: lack of breeding of male goats, feed and technology. The proposed solutions to develop goat production in Tra Vinh that increasing the rotation of male goats between districts and districts or replacing male goats every year (buying new male goats every year); Planting high-yielding grass and making use of agricultural by-products for feed and proposed researching about technology: processing and preserving of animal feed, formulating diets for raising goats in the locality.

Keywords: *Goat production status, Tra Vinh province*

SOURCE OF GREENHOUSE GAS EMISSIONS FROM LIVESTOCK AND MITIGATION STRATEGIES

Vol 111. May, 2020. Pp. 2-12

Nguyen Van Quang

Corresponding author: Nguyen Van Quang. Tel: 0989637328. Email: quangvcn@gmail.com

The livestock industry requires a significant amount of natural resources and plays an important role in global greenhouse gas emissions. The most important greenhouse gases from agriculture in animal husbandry are methane and nitrous oxide. Methane, mainly produced from fermentation and storage of feces, is a gas that affects global warming. Nitrous oxide, arising from manure storage and use of organic / inorganic fertilizers. In addition to greenhouse gases arising from the fermentation and storage of manure, food production along with carbon dioxide and nitrogen oxide emissions in the soil is another important hotspot for the livestock industry. Carbon dioxide emissions in soils are due to soil carbon dynamics (e.g., decomposition of plant residues, soil organic chemicals, changes in land use, etc.), production of synthetic fertilizers and pesticides. depth and use of fossil fuels in farm activities. Nitrous oxide emissions are generated when organic and inorganic fertilizers are applied to the soil.

Mitigation strategies to reduce the sector's emissions intensity are necessary to meet the growing demand for livestock products due to population growth. The heterogeneity of the agricultural sector needs to be taken into account when determining the overall sustainability of the mitigation strategy, which can vary between livestock systems, species and climate. In general, no single measure can guarantee adequate emissions reductions, but a combination of solutions to achieve the best results. Reduction of methane emissions during intestinal fermentation may result in an increase in greenhouse gas emissions during manure application. Reducing nitrogen oxide emissions directly during fertilizer storage can lead to higher nitrate leakage and ammonia evaporation during field use. Mitigation can occur directly by reducing greenhouse gas emissions, or indirectly through improved production efficiency.

To increase the effectiveness of mitigation strategies, complex interactions between components of the livestock system must be taken into account to avoid environmental trade-offs and livestock development.

Keywords: *Climate change, greenhouse gases, livestock, mitigation*

GROWTH PERFORMANCE AND CARCASS PERFORMANCE OF LANDRACE AND YORKSHIRE'S FROM FRENCH GENES

Vol 111. May, 2020. Pp. 13-22

Nguyen Thi Hong Nhung, Pham Duy Pham, Trinh Hong Son, Pham Doan Lan and Do Duc Luc

Corresponding author: Nguyen Thi Hong Nhung. Tel: 0902226836; Email: nguyennhung.ttd@gmail.com

This study was conducted at Thuy Phuong Research Center from 2015 to 2019 to evaluate growth and carcass performance of Landrace and Yorkshire pigs from French genetic resources. The experiment was conducted on 1125 Landrace (365 young males, 760 gilts) and 1125 Yorkshire (365 young males, 760 gilts) over 4 generations (initial, 1, 2 and 3 generations) from 30 to 100 kg. The study results showed that average daily gain and lean meat percentage of Yorkshire pigs were higher than those of Landrace ($P<0.05$), however intramuscular fat and feed conversion ration were not significantly different between two breeds ($P>0.05$). Average daily gain, lean meat percentage and intramuscular fat increased from the initial to the third generation ($P <0.05$). Landrace and Yorkshire pigs from the initial to the third generation increased average daily gain by 843.35; 894.43; 914.92 and 922.60 g per day, lean percentage by 56.67; 57.75; 58.49 and 58.59%, intramuscular fat by 2.710; 2.775; 2.803 and 2.807% respectively. In contrast, feed conversion ratio decreased over generations ($P<0.05$); these values were 2.629; 2.555; 2.530 and 2.531 kg respectively.

Keywords: *production performance, feed conversion ratio, lean meat percentage, intramuscular fat percentage, Landrace pig, Yorkshire pig.*

PRODUCTIVITY AND MEAT QUALITY OF SIN CHENG DUCK REARED IN TWO METHODS

Vol 111. May, 2020. Pp. 23-34

Pham Van Son, Ho Lam Son, Nguyen Khac Khanh, Tran Hong Thanh, Nguyen Van Trung, Nguyen Thanh Luan, Nguyen Thi Chau Giang and Ngo Thi Kim Cuc

Corresponding author: Pham Van Son; Tel: 0983669175/0946622918. Email: sonditruyenvcn@gmail.com

The objective of this study was to determine a suitable rearing method to develop Sin Cheng duck. Ducks were reared in semi - scavenging and captivity. The study was conducted from June 2019 to December 2019 at Lao Cai Poultry Breeding Company - Xuan Giao Commune, Bao Thang District, Lao Cai Province. The experiment was arranged two different breeding methods (Lot 1) semi-grazing and (Lot 2) grazing. 60 1 dayage ducklings (30♀; 30♂) were reared in each batch and repeated 3 times. A total of 360 ducks at the first day age were divided equally for each rearing method used in this study. Results from two methods showed that at 12th week age, the weight of ducks was from 2001.79 - 2435.00 g/duck, the feed consumption/ kg body weight gain was 4.49 kg - 4.60 kg, carcass percentage was from 68.10 - 68.77%, the thigh meat percentage was accounted for 12.66 to 13.29%; the breast meat percentage was accounts for from 14.55 to 14.81% for male duck; the carcasses percentage was ranged from 68.24 to 68.33%, the thigh meat percentage was accounted for from 12.37 to 13.19%, the breast meat percentage was 14.26 - 14.76%; the fat percentage of male duck was from 0.56 - 1.70% and from 0.63 - 1.84% in female duck. The protein in meat of semi-scavenging and captivity was from 21.16 to 21.77% and 21.32 - 21.92%; lipids of 1.46 - 3.02% and 4.55 - 5.62%; minerals 1.14 - 1.26% and 0.91 - 1.05%.

Keywords: *Sin Cheng duck, productivity, quality*

PRODUCTIVITY OF SIN CHENG DUCK OVER THREE GENERATIONS

Vol 111. May, 2020. Pp. 35-45

Pham Van Son, Ho Lam Son, Nguyen Khac Khanh, Tran Hong Thanh, Nguyen Van Trung, Nguyen Thanh Luan and Ngo Thi Kim Cuc

Corresponding author: Pham Van Son; Tel: 0983669175/0946622918. Email: sonditruyenvcn@gmail.com

The objective of the study was to evaluate the reproductive performance of three generations of Sin Cheng duck's nuclear herds. Ducks were reared in captivity with a playground and large bath. The research was conducted at Lao Cai Poultry Breeding Company from January 2017 to 2020. There were 2000 duck of initial generation, 2050 ducks of seond generation, 2030 ducks of third generation and reared from the first day to 73th week age. Results of observing generations showed that the survival percentage was from 95.20 to 97.00%; the weight of male duck at 8 weeks was 1772.10 - 1795.26g /duck and that of female duck was 1684.71 - 1698.29g /duck; At 22th week of age, the weight of male duck was 2273.25 - 2350.62g /duck and that of female duck was 2164.29 - 2250.75g /duck. The feed consumption / kg body weight gain was from 1NT-22th week of age in the initial generation was 16.013g /duck and the second generation was 16,155g/duck. The first egg laying age of Sin Cheng ducks was started was from 149 days, the 5% laying age was 161 days, 50% laying age was 192 days and peak laying was 223 days; In the seond generation was 148; 161; 190 and 218 days. In the period of 22 - 73th week age, the average laying percentage was 42.24% to 45.07%. The egg performance/hen /73th week age was 153.75 to 164.05 eggs. The feed consumption/10 eggs at 22-73th week age was averaged 4.94 kg feed / 10 eggs in the initial generation, 4.63 kg feed / 10 eggs in generation 1 and 4.58 kg feed/10 eggs in the second generation. The average percentage of eggs with embryos was 94.37% to 95.52%, the hatching percentage/eggs with embryos was 92.38% to 94.11%, the duck style 1 / total incubation egg was 84.16 to 84.71%.

Keywords: *Sin Cheng duck, reproduction, performance.*

EFFECT OF BREWERY WASTE SUPPLEMENTATION IN *BRASSICA CAULIFLORA LIZG* BASAL DIETS ON NUTRIENT UTILIZATION, WEIGHT GAIN, APPARENT NUTRIENT DIGESTIBILITY AND ECONOMIC RETURNS OF *CROSSBRED RABBITS (NEW ZEALAND × LOCAL)*

Vol 111. May, 2020. Pp. 46-55

Nguyen Thi Kim Dong and Nguyen Van Thu

Corresponding author: Nguyen Thi Kim Dong. Tel: 0985868745; Email: ntkdong@tdu.edu.vn

A study was conducted at the Experimental farm in Long Hoa commune, Binh Thuy district, Can Tho city to evaluate the effects of different supplementation levels of brewery waste (BW) in *Brassica cauliflora Lizg* residue basal diets on nutrient utilization, weight gain, apparent nutrient digestibility and economic returns of growing crossbred rabbits. The feeding trial was a completely randomized design with 5 treatments and three replications. The treatments were 5 supplement levels of 0, 100, 150, 200 and 250 g BW/rabbit/day (correspondings to the BB0, BB100, BB150, BB200 and BB250 treatments). There were 4 growing crossbred rabbits at 7 weeks of age (sexual balance) per experimental unit and the experimental time lasted in 10 weeks. The nutrient digestibility trial was done on 12 week- old crossbred rabbits in 7 days to evaluate apparent nutrient digestibility and nitrogen retention. The results showed that *Brassica cauliflora Lizg* residue intakes gradually decreased with increasing supplement levels of brewery in the diets, while brewery intakes increased ($P<0.05$). The daily intakes of DM, OM, CP and NDF were the significantly highest for the BB250 treatment ($P<0.05$). The rabbits supplemented 250 g BW in the BB250 treatment had higher daily weight gain and final live weight than those given others ($P<0.05$). The CP and NDF digestibility coefficients were improved in the diets supplemented BW ($P<0.05$). It was concluded that a level of 250 g brewery waste supplement in *Brassica cauliflora Lizg* residue basal diet had higher growth rate, nutrient digestibility, N retention and gave better profits.

Keywords: *Crossbred rabbit, Brassica cauliflora Lizg residue, brewery waste, growth rate, digestible nutrient*

PIG PRODUCTION STATUS AND INFECTED SITUATION OF AFRICAN SWINE FEVER DISEASE (ASF) IN BEN TRE PROVINCE

Vol 111. May, 2020. Pp. 56-66

Truong Van Hieu, Tran Ngoc Bich, Le Quang Trung, Nguyen Phuc Khanh, Tran Duy Khang, Nguyen Thi Kim Quyen, Tran Quang Thai and Nguyen Minh Dung

Corresponding author: Truong Van Hieu. Tel: 0963.775.018; Email: vanhieu@tvu.edu.vn

The study was conducted from January to March 2020 to investigate the situation of African Swine Fever disease in 08 districts and 01 city of Ben Tre province. The data used in this study included primary data and secondary data. Secondary data obtained from reports from the competent authority. Primary data collection techniques were done usingin-depth interviews and direct observation in the field by case-control study (45 pig households with ASF infected herds and 45 pig households with healthy herds); combinating with a cross – sectional method and retrospective cohort survey were carried out on 90 pig households with ASF infected herds and 10 managers about prevention, control of ASF in Ben Tre province. The results showed that in 2019, a total number of pigs dropped sharply (42.2%) compared with 2018, caused by prolongation of ASF disease and households did not reproduce. The survey results showed that, the rate of pig waste treatment by biogas (82.2%), hedge around pig pens (64.4%) and disinfectant pits in front of pig pens (53.3%) in ASF infected herds tended to be lower than healthy herds, correspondingly. Adding vitamin or probiotic in pig diets, accounting for 40% in ASF infected herds were lower than healthy herds (51.1%). The rate of pigs infected and culled by ASF that were 12.4% and 13.4% compared to the total number of pigs. Mortality rate was highest in boars (100%), piglets (91.5%), snows (86.4%) and lowest in growing pigs (85.3%). Most commonly observed clinical signs of ASF pigs such as: high fever, red to purple skin lesion, loss of appetite, dull or depressed and sudden death. Difficulties in the prevention and control of ASF: delay in reporting ASF disease by pig households, lack of human resources and techniques. Proposed solutions: intensifying communication to pig households to comprehend ASF disease and prevention; enforcing policy to support ASF control; encouraging to apply biosecurity measures in husbandry in Ben Tre province.

Keywords: *African swine fever, investigate, pig, Ben Tre province*

APPLICATION OF TOTAL AFLATOXIN CONTENT (B1, B2, G1, G2) DETERMINATION METHOD BY IMMUNOAFFINITY COLUMNON HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY (HPLC)

Vol 111. May, 2020. Pp. 67-77

Duong Thi Thu Anh, Nguyen Duc Hao and Nguyen Quang Huy

Corresponding author: Duong Thi Thu Anh. Tel: 0384436019. Email: thuanh.duong@gmail.com

The results from applying the method of determining the total Aflatoxin content (B1, B2, G1, G2) in animal feeds using High-Performance Liquid Chromatography (HPLC) have built a linear calibration curve between concentration of Aflatoxin standards (B1, B2, G1, G2) and the peak area of chromatograms with a high linear coefficient R^2 from 0.99953 to 1.00. Since then, the use of this calibration curve to calculate and determine the total Aflatoxin content (B1, B2, G1, G2) in 3 sample groups: corn grain, feed concentrate and feed mixture for pigs. These samples were representative of the animal feed production facilities in Hung Yen. The total Aflatoxin content results (B1, B2, G1, G2) in these samples were very low and were used as base samples to determine the recovery by adding the Aflatoxin standard stock 2600 ppb. The recovery of total Aflatoxin standard on sample bases was high, which was performed by two technicians in the same time period, on the same analyzer and on the same sample group. The results of the corresponding recovery were 94.60% for corn grain base samples, 83.76% for feed mixture base samples for pigs and 87.43% for feed concentrate. These results confirmed that the total Aflatoxin content analysis procedure (B1, B2, G1, G2) in animal feeds using the immunoaffinity column on High-Performance Liquid Chromatography (HPLC) was accurate and consistent with analytical equipment and skills in Vietnam.

Keywords: *total Aflatoxin content, immunoaffinity column, HPLC.*

MODEL OF PRESERVING POULTRY EGGS USING MIST SPRAY METHOD OF PARAFFIN OIL IN HUNG YEN

Vol 111. May, 2020. Pp. 78-88

Lai Manh Toan, Nguyen Van Tan, Dang Vu Hoa, Nguyen Thi Hoang Anh, Hoang Thi Hanh, Trinh Duy Linh and Phan Trung Hieu

Corresponding author: Lai Manh Toan. Tel: 0968003693; Email: laimanhtoan@gmail.com

The study was carried out to evaluate the effectiveness of poultry egg storage model by the method of paraffin oil mist spraying at 4 poultry farms (2 chicken and 2 duck farms) in Hung Yen. The results show that while implementing the preservation method, egg producers and business had to pay costs for cleaning and disinfecting eggs, buying paraffin oil with about 93 VND / egg for chicken eggs and 99 VND / egg for duck eggs, but in return, the loss rate was decreased (from 6-8% to 0.5%). Therefore, the total cost for 1 egg while preservation by this method was still lower than that without preservation (28 VND / AG1 chicken eggs and 24 VND /Japfa Brown chicken eggs, 30-31 VND / eggs for duck eggs). In addition, with this method of preservation, the egg can be kept fresh level up to 5 weeks compared to 1-2 weeks if not preserved in the summer while ensuring the quality of the sensory criteria, Haugh unit (duck eggs is 61.93-62.58, chicken eggs is 51.23-52.29), air chamber height (duck eggs is 4.23-4.35 mm, chicken eggs is 3.43-3.56 mm), microorganisms *Salmonella* (not detected in egg samples). With a total of 220.440 eggs preserved in the model (98.440 eggs of AG1, 122.000 eggs of Japfa Brown) and 213.950 fresh duck eggs, the total profit was about 133.9 million VND

Keywords: *Chicken eggs, duck eggs, preserved, paraffin, vietgahp*

KẾT QUẢ ĐÁNH GIÁ BƯỚC ĐẦU KHẢ NĂNG THÍCH NGHI, SINH TRƯỞNG, SINH SẢN CỦA ĐÀN TRÂU ĐẦM LẦY THÁI LAN NHẬP NỘI NUÔI TẠI BÌNH DƯƠNG

Vol 112. June, 2020. Pp. 2-11

Hoang Thi Ngan, Pham Van Quyen, Nguyen Van Tien, Bui Ngoc Hung, Giang Vi Sal, Nguyen Thi Thuy and Doan Duc Vu

Corresponding author: Hoang Thi Ngan. Tel: 0903050013. Email: hoangnganrrtc@gmail.com

The study was conducted on 48 Swamp buffalo cows at Ruminant Research and Development Center from January 2019 to May 2020 to evaluate adaption, growth and reproduction. They were imported from Thailand. The results showed that: They were able to climatic and feeding condition (Hematological and physiological parameters of buffalo were normal). There were no deaths and culling. The body weight of buffalo was 274.4 kg at 24 month of age, 362.7 kg at 36 month of age and 434.7 kg at 48 month of age. Age of first mating and weight

at first mating were 32.3 month and 334.5 kg respectively. Age of first calving and weight at first calving were 43.5 month and 419.5 kg respectively.

Keywords: *Adaption, growth, reproductive, Swamp Buffalo.*

EFFECTS OF JACKFRUIT LEAVES AND YOUNG JACKFRUIT ON NUTRIENT DIGESTIBILITY, WEIGHT GAIN AND METHANE PRODUCTION IN GROWING GOATS

Vol 112. June, 2020. Pp. 12-21

Lam Phuoc Thanh

Corresponding author: Lam Phuoc Thanh; Tel: 09 7576 3555; Email: phuocthanh@ctu.edu.vn

An experiment was conducted on five F1 crossbred female goats (♂ Saanen×♀ Bach Thao), 5 months old, body weight at 17.12±1.67 kg to evaluate effects of jackfruit leaves and young jackfruit replaced to elephant grass in the diet on nutrient intake, nutrient digestibility, body weight gain and CH_4 emission. All animals were fed 40% commercial concentrate in the diet, mean while other amounts were elephant grass, jackfruit leaves and/or young jackfruit. The study was carried out as a 5×5 Latin square design with 5 treatments including: 60% elephant grass (NT1), 30% elephant grass + 30% young jackfruit (NT2), 30% elephant grass+ 30% jackfruit leaves (NT3), 30% elephant grass + 15% jackfruit leaves + 15% young jackfruit (NT4), and 30% jackfruit leaves + 30% young jackfruit (NT5). Each period included 9 days for adaptation and 5 days for sample collection. Results showed that NT3 and NT5 increased total nutrient intake including DM, OM and CP ($P<0.001$). Digestible DM and OM were improved as the use of jackfruit products at 60% in the diet in relative to the control ($P<0.01$). Diets containing jackfruit leaves at both 15 and 30% increased body weight gain of goats by 2.58-3.00 folds as compared to NT1 ($P<0.01$), the impressive increase of body weight gain was found in NT3. Replacement of jackfruit leaves to elephant grass in the diets led to reduce CH_4 production by 192-250% in relative to NT1 ($P<0.05$). In conclusion, feeding either 30% jackfruit leaves or 30% jackfruit leaves plus 30% youth jackfruit is an ideal method to improve nutrient intake, digestible nutrients, body weight gain and decrease CH_4 production of dairy goat in growing stage.

Keywords: *Goats, jackfruit leaves, jackfruit fruit, digestibility, methane, weight gain-*

EFFECT OF COCONUT OIL MEAL PERCENTAGE IN THE CONCENTRATE TO CH_4 AND CO_2, DIGESTED NUTRIENTS AND RUMEN PARAMETERS OF LAI SIND CATTLE

Vol 112. June, 2020. Pp. 22-34

Nguyen Van Thu

Corresponding author: Nguyen Van Thu. Email: nvthu@ctu.edu.vn

This experiment was arranged in a 4x4 Latin square design with 4 treatments and 4 Lai Sind cattle (303 ± 17.5 kg). The treatments were elephant grass, elephant grass and concentrate without coconut meal, elephant grass and concentrate with 60% coconut meal and elephant grass and concentrate with 100% coconut meal corresponding to the EG, Co0, Co60 and Co100 treatment, repectively. Each experimental period was 16 days including 9 days for addaption and 7 days for sampling. Methane and carbon dioxide emissions was automatically measured by the JIRCAS system in 3 consecutive days and live weight of cattle was also weighed at the initial and the end of each experimental period.

The results showed that dry matter (DM) and organic matter (OM) intake (kg/animal/day) in Co0 treatment (5.83 and 5.33) and Co60 treatment (5.30 and 4.85) were significantly higher ($P<0.05$) than EG treatment (3.76 and 3.40). CP and metabolizable energy (ME) intake of Co60 treatment was significantly higher ($P<0.05$) than those of the EG treatment. The digested ether extraction (kg/animal/day) gradually increased from the EG to Co100 treatments with the higher values for the Co100 (0.279) and Co60 treatments (0.254) and the lowest one for the EG treatment (0.060). Similarly daily weight gain of cattle was from 0.276 to 0.664 kg with the higher value for the Co60 treatment and the lowest one for the EG treatment. CH_4 production (g/kg DWG) was significantly different ($P<0.05$) among the treatments and the value of the Co60 (169) was lower than that of the Co0 treament (221). There was a close linear relationship between CH_4 and CO_2 emissions with the function $y=0.122x – 64.5$ ($R^2=0.858$ và $P=0.013$). In conclusion that supplementing concentrate feed to the diets increased methane and carbon dioxide production of cattle. The Co60 treatment improved nutrient intake and digestibility and gave a reduction of the emitted methane (g/kg DWG) of 23.7% compared to the Co0 treatment.

Keywords: *greenhouse gases, ruminants, supplemented feeds, addaptation.*

INFLUENCE OF SUPPLEMENTING GARLIC *(ALLIUM SATIVUM)* ON GROWTH PERFORMANCE OF NOI CHICKEN FROM 4 TO 13 WEEK-AGE

Vol 112. June, 2020. Pp. 35-43

Nguyen Thi Mong Nhi and Nguyen Van Vui

Corresponding author: Nguyen Thi Mong Nhi. Tel: (+84)(91)8490731. Email: ntmnhi@tvu.edu.vn

This study was carried out form April to July 2018 to evaluate growth performance of Noi chicken at diet supplemented with 1% garlic powder and 1% crushed garlic by semi-industrial feed. A total of 90 Noi chickens at 4 weeks of age were completely randomized design with 3 treatments: the control treatment (treament 1) used only completely mixed feed, treament 2 supplemented with 1% garlic powder and treament 3 supplemented with 1% crushed garlic in the diet, each treatment was replicated 5 times with 6 chicks per time. The results showed that chickens were raised in treament 2 and treatment 3 significantly higher bodyweight than control at the end of 13 weeks of age. However, weight gain and FCR of chickens in treament 3 were the best in this experiment, adding 1% of garlic powder to diet increased the growth and breast rate while reducing the FCR of the Noi chicken. The slaughter at the end of experiment also showed that dietary treatments had significant effect on female chicken's breast meats rate ($P<0.05$) as compared to the control.

Keywords: *Feed convertion ratio, weight gain, garlic, Allium Sativum*.

THE APPROPRIATE PERIOD FOR HARVESTING AND MOLASSES ADDITION LEVEL FOR HAMIL GRASS SILAGES

Vol 112. June, 2020. Pp. 44-53

Nguyen Thi Thuy, Pham Van Quyen, Nguyen Van Tien, Hoang Thi Ngan, Bui Ngoc Hung, Giang Vi Sal and Doan Duc Vu

Corresponding author: Nguyen Thi Thuy. Mobi: 0974628979. Email: Nguyenthuycnty@gmail.com

Two experiments were conducted at the Ruminant research and Development Center, Binh Duong, from March 2019 to January 2020 to study effect ofharvested at different regrowth intervals on yield and quality of Hamil grass (experiment 1: Harvested at three intervals 40, 50 and 60 days) and molasses at levels (experiment 2: Three molasses addition 0, 3, 5%) on quality of Hamil grasssilages. Results showed that, Hamil grass harvested at 50 days for fresh yield was 23.9 tons/ha, had dry mater (VCK) 22%, crude protein 11.2%; crude fiber 33.9% and water-soluble carbohydrates 3.4% are suitable for fermentation. Hamil grass silage with 0.5% salt and 3% molasses has the best quality. Grass silage golden yellow color, soft, no viscosity, no mold growth, acidic smell; pH value (4.0), the lowest ratio of ammonia nitrogen to the total nitrogen (8.1%); the highest content of lactic acid (1.45%), butyric acid was not detected. It was therefore, Hamil grass harvested at 50 days and when silages additional 0.5% salt with 3% molasses for the bestquality of silage.

Keywords: *Hamil grass, harvested, quality, yield, silage, molasses.*

EFFECTS OF ARTIFICIAL INSEMINATION METHODS ON REPRODUCTIVE PERFORMANCE OF CROSSING (MIA COCK × LUONG PHUONG HEN)

Vol 112. June, 2020. Pp. 54-60

Nguyen Duc Truong, Tran Thi Hoan, Tran Van Thang, Dang Thi Thuy Yen and Nguyen Hung Quang

Corresponding author: Nguyen Duc Truong, Email: nguyenductruong@tuaf.edu.vn

This study was conducted to assess reproductive performance of crossing (Mia × Luong Phuong) of chicken by artificial insemination. Semen qualities of Mia chicken were surveyed on 9 mature chickens (30 weeks of age and 2.8 - 3.2 kg in weight) and 45 hens (30 weeks old, weighing 3.0 - 3.5 kg) were chosen. All experimentalMia and Luong Phuong chickens were characterized by appearance-characteristic features. The cocks of Mia breed were trained to exploit semen by hand massage and after each extraction the semen were assessed for quality (color, volume - V; motility- A; sperm concentration - C; VAC; and the percentage of abnormality sperm). Hens were artificially inseminated by direct delivery of semen into the hen's vagina/oviduct. Results of study showed that the cocks gained ejaculatory reflex right after the first time, 3 days and 5 days of training and the cocks without ejaculatory reflex were 44.44%, 33.33%, 11.11% and 11.11% respectively. Semen color was mostly milky white. Total straight moving sperms in an ejaculation was 1.47 billion. The dose and frequency of insemination only affected the embryonic prevalence rate ($P<0.05$), did not affect the rate of type I chicks / total

hatched chicks (P>0.05). The rate of eggs with embryos and the rate of type I chicks with the frequency of insemination every 3 days with a dose of 0.05 ml / combination is the best, reaching 93.33% and 94.94%.

Keywords: *Artificial insemination, Mia breed of chicken, Luong Phuong breed of chicken*

EFFECT OF THE REPLACEMENT OF PIG MANURE BY WATER HYACINTH (*EICHHORNIA CRASSIPES)* ON BIOGAS PRODUCTION

Vol 112. June, 2020. Pp. 61-67

Nguyen Van Thu

Corresponding author: Nguyen Van Thu. Tel: 0918549422. Email: nvthu@ctu.edu.vn

One *in vitro* experiment was carried out to assess the effect of replacement of pig manure by water hyacinth juice on biogas production. It was a completely randomized design with six treatments and three replications by using 5 litters-flasks. The treatments were the replacement levels of the pig manure by the water hyacinth juice (WHJ) based on DM basis, which were 0, 20, 40, 60, 80 and 100% (WHJ0, WHJ20, WHJ40, WHJ60, WHJ80 and WHJ100, repectively). The pig manure and the water hyacinth juice were continuously loaded into the 5 litters-flasks during 21 days at level of 5g OM per day. The data of experiment were recorded during 42 days. The results indicated that biogas production fast increased from day 7 to day 28 and then slowly decreased in all treatments. From day 7 to day 21 the methane concentration (%) increased by incubation time and for the increasing WHJ treatments, while this was slower for the WHJ0 and WHJ20. On the 21st day, the WHJ100 treatment had the highest methane rate (60.7%) and the lowest rate for the WHJ0 treatment (58.1%). It was concluded that water hyacinth juice could be used to replace pig manure for biogas production. The replacement level of 40% pig manure with WHJ gave better *in vitro* biogas and methane yield.

Keywords: *biogas, in vitro, pig manure, water hyacinth*

ECONOMIC AND TECHNICAL EFFICACY FOR MEAT GOAT PRODUCTION OF FARMERS' HOUSEHOLDS IN BINH TAN DISTRICT, VINH LONG PROVINCE

Vol 112. June, 2020. Pp. 68-79

Nguyen Van Thu

Corresponding author: Nguyen Van Thu. Email: nvthu@ctu.edu.vn

The objective of this study aimed to evaluate the current production, economic efficiency and to propose the solutions for enhancing the income of households raising meat goat in Binh Tan district of Vinh Long province, which had a sweet potato area of 13.597 ha (2018). Following method suggested by Solvin (2014), 140 households (90 with and 50 without goats) in 5 villages were interviewed and investigated. The number of studied households followed the suggestion of Solvin, the descriptive study was used to evaluate the current production, the analytical method was applied for evaluating costs and profits and the multi-regression analysis was used for assessing the production factors effecting to economic efficiency of meat goat production

The results showed that the current production of meat goat gave a high and sustainable income, less diseases and low price risk, better agro-industrial by products, more jobs created. The producers were able to adopt experiences and application, buying the Boer breed to improve the meat goat quality and good animal houses. However, the production was still small scales, the meat goat trading was run by the midle men, slaughtering and meat processing were self service in villages without veterinary examination. The scientific application to improve the meat goat production and quality was limited, particularly in use of crossbred Boer does with the constrained reproduction. The trainings for tranfering new technologies to enhance goat meat production provided by the district seemed to be ignored, especially the research activities to improve meat goat breed, nutrtion, feed, yield, meat quality for better income were very limited. A significantly different profit (P<0.05) between the households with and without raising meat goats and this was higher 1.5 time for the raising meat goat ones, while their family incomes were similar (P>0.05). There were eight (8) factors significantly affecting to the profit being goat number (SLD), educational level (TĐHV), production cost (CP), feeding technology (KTN), land area (DTĐ), production yield (NS), available feed source (TA), breed (GD), labour number (SLD), feeding time (TGN) and experiences (KN), respectively. Which was predicted by the multi-regression function Y (million VND) = -21.2 + 1.46 SLD + 2.17 TĐHV – 0.000000350 CP + 16.5 KTN + 1.90 DTĐ + 1.93 NS + 10.5 TA + 11.3 GD + 4.12 SLĐ + 3.36 TGN + 0.177 KNN (R^2 = 0.86 và P=0.000). The proposed ideas for better meat goat production in the Binh Tan district could be developing effective production models, studying to create the improving does in reproductivity, utilizing sweet potato residues as feeds, providing more training courses and facilities for slaughters and veterinary examinations.

Keywords: *Environment, meat yield, ruminants, sweet potato, profitable.*

EFFECT OF CATTLE MANURE MANAGEMENT ON CH_4, NH_3, CO_2 AND H_2S EMISSIONS IN CATTLE BARN

Vol 112. June, 2020. Pp. 80-88

Dau Van Hai, Nguyen Thi Hong Trinh, Le Ba Chung, Pham Minh Quan and Nguyen Thi Anh

Corresponding author: Dau Van Hai. Tel: 0918088570. Email: hai.dauvan@iasvn.vn

The experiment was conducted at beef cattle households in Ben Cat town, Binh Duong province to evaluate effect of cattle manure management and treatment on CH_4, NH_3, CO_2 and H_2S emissions in cattle barn. The experiment was arranged in a randomized group design, with two treatments (Control and experimental treatment), in each treatment 5 Lai Sind cattles (3 breeding cows and 2 calves) per experimental unit were applied with 9 replicates. In which, the cows were the same in terms of body weight, age, number of parities and last calving date, the calves were the same in terms of sex ratio (1 male and 1 female / experimental unit), age and body weight in 2 treatments; Feeding method and diet in 2 treatments were the same. The results show that concentration of CH_4, CO_2, NH_3 and H_2S inside and outside of the barn in the experimental group were in ranged of TCVN (TCVN 5938-1995) and QCVN (QCVN 01-79: 2011), but in the control group they were exceeded, specifically: Concentration of CH_4, CO_2, NH_3 and H_2S inside the barn in tlhe control treatment was higher than that in the experimental treatment 4.0; 2.3; 1.8 and 6.4 times respectively. Similarly, the gas concentration outside the barn in the control group was higher than that in the experimental group 7.6; 6.9; 3.2 and 15.0 times respectively. Time of mating after calving of cows decreased by 11.1 days comparing to control group, weight gain of 2-12 months- old calves was 449.0 g / head / day, higher than in the control group 5.57%. The rate of cases and number of days of animal having gastrointestinal and respiratory disease in experimental group decreased comparing to the control group.

Keywords: *Biogas, Compost pit, Methane (CH_4), Ammonia (NH_3), Carbon dioxide (CO_2), Hydrogen sulfide (H_2S)*

EVALUATION OF FERTILITY CHARACTERISTICS OF IMPORTED THAI LAN SWAMP BUFFALO IN THE MOUNTAINOUS ANIMAL HUSBANDRY RESEARCH AND DEVELOPMENT CENTER - THAI NGUYEN

Vol 113. July, 2020. Pp. 2-13

Nguyen Duc Chuyen, Nguyen Van Dai, Nguyen Huy Huan, Nguyen Thanh Luan, Nguyen Huy Den, Nguyen Thi Thu Trang and Nguyen Gia Huan

Corresponding author: Nguyen Duc Chuyen, Mobile: 0944 758 797; Email: nguyenducchuyen@gmail.com.

30 female buffaloes were imported from Thailand in May 2017 raising on The Mountainous Animal Husbandry Research and Development Center. The study on characteristics and reproductive ability of Thai buffalo was done form 2018-2020. The results show that the first estrus age of Thai buffalo is 31.54 months; eostrus cycle is 25.71 days; estrus time is 29.96 hours. The buffalo is in heat at 21-22h (64.71%) mainly. Age for first insemination is 35.23 months; first calving age 44.72 months; the time of returning estrus after giving birth is 5.10 months (from 2.63 to 7.71 months); Rate of mating pregnant at first heat cycle is 71.23%; reproductive rate in 2019 is 65%; the distance between two litters is 17.18 months. The female buffalo has good ability to raise offspring, the weight of newborn female buffalo is 28.58 kg, the male buffalo is 30.42 kg; the weight of female buffalo is 122.18 kg at 6 months of age, the male buffalo is 132.25 kg; Weight gain (gr/buffalo/ day) during this period for female buffalo is 520.01g, male buffalo is 565.7g.

Keywords: *Swamp buffalo, reproduction, age of estrus, returning estrus after giving birth, distance between two litters.*

ADAPTABILITY ABILITY, GROWTH AND REPRODUCTION OF IMPORTED SENEPOL COW BREED RAISED AT BAVI CATTLE AND FORAGE RESEARCH CENTER – HANOI

Vol 113. July, 2020. Pp. 14-24

Phung Quang Truong, Phung Thi Dieu Linh, Le Van Thuc, Ngo Dinh Tan and Tang Xuan Luu

Corresponding author: Phung Quang Truong. Tel: 0912233974, Email: truongbavi@gmail.com

The objective of this study was to evaluate adaptability, growth and reproductive performance of Senepol beef

cattle under Vietnam condition. 30 imported Senepol cows at 14 to 18 months old and 14 Senepol calves borned in Vietnam at 6 months old were used in this trial. The experiment was carried out in Bavi Cattle and Forage Research Center from November 2018 to March 2020. The results were shown that: (1) Adaptability of imported cows: the walking and eating time were taken from 11 to 17 h per day; the rest and ruminating time were taken from 7 to 13 h per day; sleeping time was from 3 to 5 h per day. In Winter - Spring season the body temperature in the morning and in the afternoon ranging from 37.40 to 38.30°C, breathing rate from 29.2 to 48.7 times per minute and heart rate from 62 to 70 times per minute. In the Summer - Autumn the body temperature were 38.30°C in the morning and 39.20°C in the afternoon, the breathing rate from 31.8 to 51.5 times per minute and heart rate from 64 to 73 times per minute; (2) Growth performance: The body weight of imported cows at 14 month old was 384.87 kg, 18 month (417.46 kg), 22 month (508.26 kg) and 26 month (582.63 kg). The growth rate at 14 months to 26 months old in imported cows ranged from 0.592 to 0.756 kg/head/day. The average birth weight of calves borned in Vietnam was 33.9 kg compared with 33.9 kg of imported cows, the body weight at 2 months old were 113.5 kg (imported cows) and 114.1 kg (borned in Bavi), the body weights at 6 month were 174.1 kg (imported cows) and 176 kg (borned in Bavi); (3) Reproductive performance: The age at first oestrus was 20.67 months, age at first insemination was 21.74 months, body weight at the first insemination was 405.5 kg, conception rate at the first insemination was 73.91% and number of AI per conception reached 1.46.

Keywords: *Senepol, Adaptation, Growth, Reproduction.*

GROWTH, PHYSIOLOGICAL CHARACTERISTICS AND REPRODUCTIVE PERFORMANCE OF HYBRID SOWS LRVCN-MS15 AND YVCN-MS15

Vol 113. July, 2020. Pp. 25-34

Pham Duy Pham, Trinh Hong Son, Trinh Quang Tuyen, Nguyen Ngoc Minh, Vu Van Quang, Hoang Duc Long, Ly Thi Thanh Hien, Bui Thi Tu, Nguyen Long Gia and Le Van Sang

Corresponding author: Pham Duy Pham; Tel: 0989.068.825; Email: phamduynl@gmail.com

To estimate the growth capacity of hybrid sows LRCVN-MS15 and YVCN-MS15, a total of 60 females LRVCN-MS15 pigs and 60 females YVCN-MS15 pigs, which were kept in 10 pigs/pen, were sent to performance testing from 25 to 80kg. After performance testing, 40 gilts LRVCN-MS15 and 40 gilts YVCN-MS15 were selected to estimate the physiological characteristics and reproductive performance. The results showed that the average daily gains of LRVCN-MS15 and YVCN-MS15 were 648.43 and 639.80 g/day, respectively; the backfat thicknesses were 15.5 and 15.32 mm, respectively. LRVCN-MS15 and YVCN-MS15 were early puberty and there was no significant difference between them. The age at first oestrus and the first mating were 163.15 and 185.7 days (LRVCN-MS15), 162.88, and 184.33 days (YVCN-MS15). Besides, LRVCN-MS15 and YVCN-MS15 had good reproductive performance when mated with Duroc and PiDu boars. The number born alive and the total offspring/sow/years of LRVCN-MS15, when mated with Duroc and PiDu, were 13.33 and 13.34 piglets, and 29.02 and 29.20 pigs. These traits for YVCN-MS15 were 13.35 and 13.29 piglets, and 29.39 and 29.12 pigs.

Keywords*:* *Growth performance, physiological characteristics, reproductive performance, LRVCN-MS15 pigs, YVCN-MS15*

PERFORMANCE OF MEO PIG NUCLEUS HERDS IN THE SECOND GENERATION

Vol 113. July, 2020. Pp. 35-42

Ngo Thi Kim Cuc, Pham Sy Tiep, Hoang Thi Phi Phuong, Nguyen Van Trung and Thai Khac Thanh

Corresponding author: Pham Sy Tiep. Tel: 0913506505. Email: phamsytiep@gmail.com

The experiment was carried out in Nghe An Breeding Center in 2018 - 2020 to evaluate performance of Meo pig nucleus herds in the second generation as a basis for selective, multiply nuclear herds, provide gilts with good breeding tips for production. Experiment I was conducted to monitor a total of 20 sows; gilts and pregnant sows were randomly divided into 4 groups (corresponding to 4 replicates), each group consisted of 5 pigs; gestation period II to farrowing stage, raising 1 sow per lot; Experimental pigs are raised in barn with a yard, ensuring uniformity in age, weight and care and nurturing regime. Experiment II was conducted on 20 young boars and 60 gilts. The boars and gilts are randomly divided into 5 pigs/lot (corresponding to each lot are one replicate), the pigs are raised in barn with a yard, ensuring uniformity in age, weight and nurturing care; The follow-up time starts when the boars and gilts are 60 days old until they are 8 months old.

The results showed that the nuclear Meo pigs had first estrus age, first mating age, first farrowing age in generation II at 210.22; 241.15 và 355.21 days old, respectively. The number of newborns piglets/litter, number born alive/litter, number of weaned piglets/litter are from 8.18, 7.72 and 7.26 piglets, respectively. The newborn piglets weight/litter and weaning piglets weight/litter are 3.94 kg and 41.16 kg, respectively. The body weight of boar and gilt at 8 age month are 45.97 kg and 44.78 kg, respectively. The Meo pig nucleus herds have had good growth ability.

Keywords: *reproductive, performance, growth, Meo pig*

PERFORMANCE OF CO PIG NUCLEUS HERDS IN THREE GENERATIONS

Vol 113. July, 2020. Pp. 43-50

Ngo Thi Kim Cuc, Pham Sy Tiep, Hoang Thi Phi Phuong, Nguyen Van Trung and Le Dinh Phung

Corresponding author: Pham Sy Tiep. Tel: 0913506505. Email: phamsytiep@gmail.com

The experiment was carried out in Breeding Center belonging to the Institute of Research and Development, Hue Agriculture and Forestry University from 2018 - 2019 to evaluate performance of Co pig nucleus herds in three generations. Experiment I was conducted to monitor a total of 20 original generation sows and 20 first generation sows; In each generation, gilts and pregnant sows were randomly divided into 4 groups (corresponding to 4 replicates), each group consisted of 5 pigs; gestation period II to farrowing stage, raising 1 sow per lot; Experimental pigs are raised in barn with a yard, ensuring uniformity in age, weight and care and nurturing regime. Experiment II was conducted on young boars and gilts. The boars and gilts are randomly divided into 4 lots (corresponding to 4 replicates), each group consists of 5 pigs, the pigs are raised in barn with a yard, ensuring uniformity in age, weight and nurturing care; The follow-up time starts when the boars and gilts are 60 days old until they are 8 months old.

The results showed that first estrus age, first mating age, first farrowing age of the nuclear Meo pigs reduced via generation from 221.64 day to 216.21 day, 258.16 day to 241.28 day and 372.85 day to 355.65 day, respectively. The number of newborns piglets/litter, number of newborns living piglets/litter, number of weaned piglets/litter increased from 10.9 to 11.72% compared to the original generation. The newborn piglets weight, the newborn piglets weight/litter and weaning piglets weight/litter in generation I increased from 8.47 to 34.68% compared to the original generation. The Meo pig nucleus herds in the second generation have had good growth ability, Average daily gain (ADG) in the period of 2 - 8 months was to 209.50 g/day for boars and 201.39 g/day for gilts.

Keywords: *reproductive, performance, growth, Co pig*

STUDY ON FEED FORMULATION USING LOCALLY AVAILABLE FEED INGREDIENTS FOR HOA LAN DUCKS

Vol 113. July, 2020. Pp. 51-63

Nguyen Thi Hong Trinh, Dau Van Hai, Le Ba Chung, Nguyen Viet Nguyen and Hoang Tuan Thanh

Corresponding author: Nguyen Thi Hong Trinh; Tel: 0975829470; Email: trinhias@gmail.com

The experiment was conducted in a duck household in long an province from 7/2019-7/2020 to study on feed formulation using local available ingredients for Hoa Lan ducks. 2400 one-old ducklings (480 males and 1920 females) were arranged according to the completely randomized design (CRD) with 4 different diets in term of the rate of replacing commercial feed (TAHH) with the feed formulating using local available ingredients (0%, 35%, 70% and 100%), 3 replicates. Results reveal that replacing commercial feed with the feed formulating using local available ingredients up to 100% didn't effect to survival rate, body weight, egg yield and hatching ability of ducks, egg production/hen/52 weeks of laying, feed consumption per 10 eggs in all treatment ranged from 219.5-220.7 egg and from 3.11-3.18 kg respectively. However, these replacing reduced up to 22.0% feed cost.

Keywords: *body weight, diet, egg yield, fcr/10 eggs, growth, Hoa Lan ducks*

EFFECT OF PROBIOTICS SUPPLEMENTAION IN BEDDING ON PRODUCTION PERFORMANCE OF HOA LAN DUCKS

Vol 113. July, 2020. Pp. 64-76

Dau Van Hai, Nguyen Thi Anh, Pham Minh Quan, Nguyen Viet Nguyen and Hoang Tuan Thanh

Corresponding author: Dau Van Hai; Tel: 0918088570; Email: hai.dauvan@iasvn.vn

This study aimed to investigate the effects of probiotics supplementation in bedding on growth and reproductive performance of Hoa Lan ducks. The study was carried out from 10/2018 to 2/2020 at a duck household in Tien Giang province. 1 day-old ducklings were aranged in 2 groups, in each group there were 50 males and 200 females, 3 repetitions. Group 1 (control group): None supplementation and Group 2 (experimental group): Supplemention of probiotics in bedding. The results showed that during 72 weeks of raising, density of *E.coli* and *Salmonella* were greatly reduced, survival rate of male and female ducks were increased 2.58% và 1.45%, rate of egg-laying was higher 0.87% in the experimental group comparing to the control group. Egg production/hen/52 weeks of laying reached 218.79 egg and higher 3.16 egg than in the control group. The everage of egg weight in experimental group was 72.65g/egg, while 71.88 g/egg in control group. FCR/10egg in experimental group reduced 0.11kg. The rate of embryo and hatching in experimental group showed higher than in control group. The experimental group increased economic efficiency to farmer (8.1%) as compare with control group.

Keywords: *Probiotics, E.coli, Salmonella, FCR/10 eggs, laying rate, Hoa Lan duck*

REVIEW ON THE ENVIRONMENTAL AND BIOSECURITY CHARACTERISTICS OF LIVESTOCK CARCASS DISPOSAL METHODS

Vol 114. August, 2020. Pp. 2-14

Nguyen Thanh Trung

Corresponding author: Nguyen Thanh Trung; Tel: 096 2011 497; Email: trung0475@yahoo.com

Animal mortality is an integral part of livestock farming and proper disposal of these mortalities is necessary for effective disease control measures. Various disposal methods are being used throughout the world depending upon the legislations which are followed in different countries. In developing countries, the most widely used disposal methods are the traditional methods like: burying, burning, incineration, rendering and composting. There are some environmental, biosecurity, social and economic issues associated with these methods. Environmental constraints associated with these disposal methods are like: contamination of air, soil and water particularly due to persistency of some infections like ASF (African swine fever). Social concerns with these traditional disposal methods are: odour, contamination of drinking water and food chain. Similarly the economic constraints are associated with the alarming increase in the costs of raw materials like: electric, diesel and wood for burning. Issues are also related with the labor cost, availability of land and transportation of mortalities to site of disposal. In this review, environment and social issues, biosecurity risks and economic constrains will be discussed for each of these traditional methods.

Keywords*: Animal mortality, disposal methods, environment, biosecurity*

THE RESULTS OF SELECTION AND CREATION OF TWO SEA DUCK LINES FOR PRODUCTION IN MANGROVE AREA

Vol 114. August, 2020. Pp. 15-28

Le Thanh Hai, Le Van Trang, Duong Xuan Tuyen, Pham Thi Như Tuyet, Nguyen Thanh Son and Nguyen Van Duy

Corresponding author: Le Thanh Hai. Tel: 0918.567547, Email: haivigova@yahoo.com.vn

This study was conducted from the 2017 to 2020 at VIGOVA duck breeding farm, Binh Duong province. Selection method based on estimates of breeding values (EBV) by Best Linear Unbiased Prediction (BLUP) and economic coefficients of traits. Two- lines of sea duck have been created (maile line VB3 and femail line VB4) through 4 selective generations. Age at first egg laying, egg production per female to 42 laying weeks (EN52), egg weight (EW), FCR (feed conversion ratio)/10 egg, embryo rate and hatchability on set eggs of the VB3 line were 159 days, 221.93 eggs, 81.06 g, 3.41 kg, 93.44% and 77.74%; These parameters on VB4 line were 152 days, 245.86 eggs, 78.95 g, 3.18 kg, 96.17% and 80.67%. Heritability coefficients (h^2) of body weight at 7-

weeks-old and egg number at 20 laying weeks of VB3 line were 0.41 và 0.22. Heritability coefficients (h^2) of body weight at 8-weeks-old, egg number at 20 laying weeks and egg weight at 19-20 laying weeks of VB4 line were 0.27, 0.25 and 0.44. Genetic progress (Δ_G) in body weight at 7-weeks-old and egg number at 20 laying weeks of VB3 line reached 43.46 g/generation và 0.45 egg/generation. Δ_G VB3 line's body weight at 8-weeks-old, egg number at 20 laying weeks and egg weight at 19-20 laying weeks of VB4 line were 17.65 g/generation and 0.77 egg/generation và 0.52 g/generation in correspondence. Body weigh at 7-weeks-old of VB3 and VB4 lineson male and female with liberal diet reached 2706.40 g, 2604.80 g and 2483.80 g, 2363.40 g respectively. FCR/body weigh gain 7-weeks-old of VB3 and VB4 lines were 2.57 kg and 2.66 kg.

Key words: *Selection, Sea ducks, genetic progress.*

APPEARANCE CHARACTERISTICS AND ABILITY FOR COMMERCIAL CHICKEN MEAT OF 3 COMBINATIONS OF DOMESTIC CHICKEN BREEDS MD1.BĐ, MD2.BĐ, MD3.BĐ

Vol 114. August, 2020. Pp. 29-39

Le Van Du

Corresponding author: Le Van Du. Tel: 0913498702. Email: minhdu1973@gmail.com

The study was carried out on Minh Du Poultry Breeding Limited Company, Huynh Mai, Phuoc Nghia, Tuy Phuoc, Binh Dinh. The objective is to assess phenotypic characterisation and grow ability as well as meat performance of MD1.BĐ, MD2.BĐ, MD3.BĐ chicken. A number of 300 chicken/crossbreed with 3 repeatations was observed. The results showed that at 13 weeks of age, the feather colour of MD1.BĐ and MD2.BĐ and MD3.BĐ cook were black red. The MD1.BĐ hens are light brown. MD2.BĐ and MD3.BĐ hens are dark gray and dark brown feathers. The color of the skin, beak and legs at 1 day and 13 weeks is yellow. The average survivability from 0 to 13 weeks of age was from 97.0 to 99.0%. The average body weight at 13 weeks of MD1.BĐ, MD2.BĐ, MD3.BĐ was 1,810.02g, 2,000.31g and 2,200.25g, respectively. Feed conversion ratio (PCR)/kg increased body weight at 13 weeks of age was from 2.22kg to 2.41 kg. Eviscerated carcass ratio, breast muscle ratio, leg muscle ratio, and abdoment fat ratio are 78.92%, 19.75%, 24.01% and 0.67% respectively. Carcass ratio of MD1.BĐ, MD2.BĐ, MD3.BĐ was 78.30%, 78.13% and 78.92%, respectively. Ratio between breast muscle and leg muscle of MD1.BĐ, MD2.BĐ, MD3.BĐ 42.77%, 42.19% and 42.01%, respectively.

Keywords: *MD1.BĐ chickens, MD2.BĐ chickens, MD3.BĐ chickens, color feather chicken.*

SELECTIVELY CREATE TWO LINES OF CANE CHICKEN OVER 4 GENERATIONS

Vol 114. August, 2020. Pp. 40-52

Nguyen Quy Khiem, Pham Thuy Linh, Dao Thi Bich Loan, Tran Ngoc Tien, Le Xuan Son, Pham Thi Lua, Nguyen Trong Thien, Le Ngoc Tan, Vu Quoc Dung, Dang Dinh Tu, Nguyen Thi Hoai Thu, Pham Thi Hue and Nguyen Thi Minh Huong

Corresponding author: Thuy Phuong Poultry Research Center; Tel: 0243.8385803/024.38389773;
Email: giacamthuyphuong@gmail.com

The study was conducted in Pho Yen Poultry research station in Thai Nguyen from 2017 to 2020. Mia chicken was selected as the initial material for the selection of the male line (GM1) and female line (GM2). The bodyweight of both lines was measured at 8 weeks old. Egg production of GM1 and GM2 was evaluated at 38 and 68 weeks old. At 8 weeks old, males of GM1 achieved the bodyweight of 862.09g/bird, increasing by 109.66g/bird compared to birds of the initial generation. Female of GM1 acquired 673.47g/ bird, more weight of 84.48g/bird was observed. Heritability of body weight at 8 weeks old was 0.43, genetic progress of male body weight was 29.01g/ generation and it was 26.07g/generation in the female birds. Egg production/bird/68 weeks old was 121.27 eggs at the second generation; feed consumption per 10 eggs was 3.47kg. The results from the GM2 line showed that the bodyweight of GM2 was 711.53g/ and 575.27g/bird in males and females respectively. Egg production/bird/38 weeks old was 55.36 eggs, increasing by 3.38 eggs/bird compared to the number of eggs of the initial generation; heritability of egg production was 0.27; genetic progress of egg production was 1.4 egg/generation. Egg production /bird/68 weeks old was 125.87 eggs at the second generation; feed consumption per 10 eggs was 3.34kg.

Keywords: *Body weight, egg production, Mia, selection*

CHOOSING TO CREATE TWO LINES OF EGYPTIAN CHICKEN OVER 4 GENERATIONS

Vol 114. August, 2020. Pp. 53-63

Nguyen Quy Khiem, Pham Thuy Linh, Tran Ngoc Tien, Dao Thi Bich Loan, Le Xuan Son, Nguyen Thi Minh Huong, Nguyen Thi Yen and Pham Thi Hue

Corresponding author: Nguyen Quy Khiem. Tel: 0243.8385803/024.38389773; Email: giacamthuyphuong@gmail.com

The topic was carried out at Thuy Phuong poultry research centre from January, 2017 to October, 2020. From the original Egyptian chickens materials were chosen and oriented in two lines: AC1 rooster line with enhancing egg yield and AC2 hen line with enhancing egg weight. The result through three choosing generations AC1 chickens had egg yeild per 38 weeks old of the third generation reached 85.35 eggs, higher than the first generation 5.86 eggs, the egg yeild per 72 weeks old of the second generation reached 205.79 eggs, higher than the first generation 3.02 eggs. The genetic coefficient about the egg yeild was 0.23±0.02 and the genetic achievement reached 1.96 eggs per one generation. The AC2 chickens had the egg yeild per 38 weeks old of the third generation was 75.91 eggs; the egg yeild per 72 weeks old of the second generation reached 195.09 eggs, the egg weight reached 46.26 grams, higher than the first generation 1.64 grams. The genetic coefficient and the egg weight were 0.28±0.01 and the gentic achievement reached 0.45 grams per one generation.

Key words: *Choosing, AC chicken, egg yeild, egg weight*

EFFECT OF TANNIN SUPPLEMEMT FROM TEA PROCESSING BY-PRODUCTS ON *IN VIVO* DIGESTIBILITY, GROWTH RATE AND ENTERIC METHANE EMISSION FROM FATTENING BEEF CATTLE

Vol 114. August, 2020. Pp. 64-76

Le Tuan An, Chu Manh Thang and Tran Hiep

Corresponding author: Chu Manh Thang; Tel: 0989126940; Email: thangslu@gmail.com

The experiments were conducted on 24 crossbred bred cattle (323.1 ± 30.4 kg) using for the trial of 90-dayslasting experiment in order to determine methane emission by addition of tannin from tea by-products. Cattles were housed in farm housing condition then were individually arranged to respiratory chambers to measure methane gas emissions. The diets consisted of basal diets with addition of 0.0%; 0.3%; 0.5% and 0.7% tannin from tea by products on dry matter basic. Animals were fed *ad libitum* experimental diets for 15 days of adaptation prior to testing. Results showed that the effect of different levels of tannin supplementation on the level of CH_4 and CO_2 emissions of experimental cattle was from 268 to 306 liters/day, there was a significant difference in the amount of methane released ($P<0.05$). The control had the largest emitted methane at 306 liters/day. The supplementation tannin at 0.3-0.5% DM, did not affect on DM intake, and *in vivo* digestibility but improve the growth rate (by 2.2-8.1%) and reduce methane emission intensity (by 7.9-26.2%, calculated as CH4/kg LWG. It was concluded that the optimum level of tea tannin supplement in fattening beef cattle diet was of 0.4% (0.38-0.41%, DM basic).

Keywords: *tea tannin, in vivo digestibility, growth rate, enteric methane emission.*

RESULTS OF SELECTING STABILITY FILTERS 3 LINE COLOR CHICKEN TN1, TN2 AND TN3

Vol 115. September, 2020. Pp. 2-12

Pham Thuy Linh, Nguyen Quy Khiem, Nguyen Trong Thien, Dang Dinh Tu, Le Ngoc Tan, Vu Quoc Dung, Le Van Hung, Nguyen Thi Thu Hien and Pham Thi Lua

Corresponding author: Thuy Phuong Poultry Research Center. Tel: 0243.8385803/024.38389773; Email: giacamthuyphuong@gmail.com

Stable yield selection over 3 generations from 2018 to September 2020 at Pho Yen Chicken Research Station-Thuy Phuong Poultry Research Center based on the estimated seed value using BLUP method: for The TN1 drum line was selected for body weight at 8 weeks of age, for the two hen lines TN2 and TN3 selected egg yield at 38 weeks of age with the TN1 drum line target: body weight at 8 weeks of age, chickens cocks reach 2600-2650g, hens reach 2200-2250g; the hen lines TN2: egg yield ≥178 eggs/hen/64 weeks of age; the hen line TN3:

egg yield was ≥ 183 eggs/hen/64 weeks old. Results through 3 selective generations: The TN1 chicken line had a body weight of 8 weeks, roosters reached 2621.35g, hens reached 2203.86g, genetic coefficient was 0.32, genetic progress achieved in Cock is 15.40 g/generation, in hens 9.91 g/generation, egg yield/hen/64 weeks of age is 152.74, the embryo rate is 96.35-96.84%. The TN2 chicken line had 68.97 eggs/hen/38 weeks of age, the genetic coefficient was 0.12, the egg yield/64 weeks of age was 180.46, the embryo rate was 96.87-97.52%. The TN3 chicken line yielded eggs/hen/38 weeks of age reached 70.28 eggs, the genetic coefficient was 0.12, the yield of eggs/hen/64 weeks of age reached 185.12, the embryo rate was 96.72- 97.34%.

Keywords: *selection, TN chickens, body weight, egg yield*

EFFECT OF APPLING VETERINARY HYGIENE METHODS FOR DISEASE PREVENTION ON GROWTH AND REPRODUCTIVE PEFORMANCE OF HOA LAN DUCKS

Vol 115. September, 2020. Pp. 13-25

Nguyen Thi Hong Trinh, Dau Van Hai, Pham Minh Quan, Nguyen Thi Anh and Hoang Tuan Thanh

Corresponding author: Nguyen Thi Hong Trinh; Tel: 0975829470; Email: trinhias@gmail.com

The arm of this study was to evaluate the effect of applying veterinary hygiene methods for disease prevention on growth and reproductive performance of Hoa Lan ducks. The experiment was conducted at a duck household in Tien Giang province from 2017 to 2019. One day-old ducklings were aranged into 2 groups, in each group there were 40 males and 160 females, 3 repetitions. The Group I: Applying veterinary hygiene methods for disease prevention, Group II (control): Current methods of duck rearing the farmers applying. The results show that applying veterinary hygiene methods for disease prevention reduced rate of respiratory and diarrhea disease (3.8 and 2.5 times respectively), increased survival rate (2.1-2.4%), laying age was sooner 4 days (144.3 vs 148.3 days) comparing to in the control group. The egg production was 218.32 egg/female/52 weeks (7.69 eges more than in the control), laying rate of 59.79% (2.27% higher than in the control). FCR/10eggs was lower (3.31 kg vs 3.47 kg). Hatching rate was not effected. Applying veterinary hygiene methods for disease prevention in Hoa Lan ducks rearing increased economic efficiency to farmer (9.2%) comparing to current methods of duck rearing the farmers applying.

Keywords*: Body weight, disease prevention, laying rate, FCR/10 eggs, veterinary hygiene*, *Hoa Lan duck*

PRELIMINARY RESULTS OF EFFECTS OF PROBIOTIC SUPPLEMENTATION ON FEED AND NUTRIENT INTAKES AND REPRODUCTIVITY OF CROSSBRED RABBIT DOES (CALIFORNIAN X LOCAL) IN LITTER 1

Vol 115. September, 2020. Pp. 26-38

Nguyen Van Thu

Corresponding author: Nguyen Van Thu. Tel: 0918549422. Email: nvthu@ctu.edu.vn

The aim of this study was to determine the optimum level of probiotic incubated with wheat in the diets of does. Twenty five young Californian rabbit does were allocated in a complete randomized design with 5 treatments and 5 replications. The treatments were LU_P0, LU_P1,25, LU_P2,5, LU_P3,75 và LU_P5 corresponding to 5 levels of probiotic (Bio-Prozyme) incubated with wheat in diets being 0; 1,25; 2,5; 3,75 và 5% (DM basis). The diets included Para grass, water spinach, cabbage waste, soybean extract meal and wheat. The product supplemented included 96.0% wheat, 3% Bio-prozyme and vitamins and minerals 1% (feeding form). The results demonstrated that nutrients and energy intakes of does in pregnant period was the highest for the LU_P3,75 treatment ($P<0.05$) compared to others and they were 127; 27.9; 48.6 g/doe/day and 1,32 MJ/doe/day. For the LU_P0, LU_P1,25, LU_P2,5 and LU_P5 treatments these values were 121-122; 27.0-27.4; 44.6-46.5 g/doe/day và 1.27-1.28 MJ/doe/day, respectively. In the lactating period the nutrients and energy intakes followed the similar intake pattern of the does in the pregnant one and DM, CP, NDF và ME intakes of LU_P3,75 treatment were the highest values being 160; 35.0; 60.8 g/doe/day and 1.66 MJ/doe/day. While in the rest of treatments these values were 150-155; 33.5-34.4; 55.6-58.6 g/doe/day và 1.57-1.63 MJ/con/ngày, respectively. There were the increases of daily weight gain of does weekly in pregnant and lactating periods and they were 9.00-10.9 g/doe/day and 8.00-9.21 g/doe/day, respectively. In the LU_P3,75 treatment, the weaning weight per rabbit, weaning kid weight per litter, milk production per doe and daily weight gain of kid were significantly higher ($p<0.05$) than those of the others.

From the preliminary results, the conclusion could be that supplementing probiotic incubated with wheat at a level of 3.75 % (DM) improved daily weight gain of rabbit does, weaning kid weight per rabbit, weaning kid

weight per litter, milk production per doe and daily weight gain of kid; and the experiment should be continued to evaluate the next litters to confirm the results for the practice recommendations.

Keywords: *Bio-Prozyme, lactating does, nutrition, pregnancy, reproductive performance*

EFFECT OF SUPPLEMENTING DIETARY ANERGY BY GROUND MAIZE ON RUMEN ENVIRONMENT, MICROBIAL NITROGEN SYNTHESIS, GROWTH AND ESTRUS OF FEMALE GOAT

Vol 115. September, 2020. Pp. 39-51

Nguyen Van Thu

Tác giả liên hệ: Nguyễn Văn Thu. Tel: 0918549422. Email: nvthu@ctu.edu.vn

This experiment was conducted aiming to evaluate the effect of supplementing dietary energy by ground maize for F1 female crossbred goats (Saanen x Bach Thao) on nutrient utilization, rumen microbial nitrogen synthesis, growth and estrus. It included 12 goats at 4 months of age (11.6 kg), were allocated in a complete randomized design with 4 treatments and 3 replicates. The treatments (g ground maize/animal/day) were BN0 (no maize supplementation), BN5 (5g), BN10 (10g) and BN15 (15g) at the beginning of the experiment. Feeds used for diet formulation were Hamill grass, cabbage waste, *Spophocarpus scandén* and coconut cake meal. The experimental duration was 3 months and a increase of total diet (DM) of 2% for every 2 weeks was applied. The nutrient digestibility trial was implemented at the beginning of the 4th month of the experiment for 7 days.

The results showed that nutrient intake and digestibility, rumen pH and volatile fatty acids concentration, nitrogen retention and daily weight gain were not significantly different (P>0.05) among the treatments. However, the DM intake (g/animal/day) had a trend of gradual increase, when increasing maize from BN5 to BN10 (693 to 719), at the treatment BN15 it was slightly reduced (691). While rumen N-NH_3 N-NH_3 concentrations at 0 and 3 h after feeding gradually increased for the maize-supplementaion treatments (P<0.05). The microbial nitrogen synthesis was higher (P<0.05) for the maize-supplementation diets and was optimal for the BN10 treatment (4.45 compared to 2.78, 2.99 and 3.39 g/day). There was also an improvement of the first estrus behaviour (P<0.05). In conclusion that no significant effect of dietary maize-supplementation has been found on nutrient intake and digestibility, rumen pH and volatile fatty acids concentration, nitrogen retention and daily weight gain among the treatments, however there were improvements of microbial nitrogen systhesis, the first estrus time and ecomomic return with the optimum benefits for the BN10 treatment.

Keywords: *crossbred goat F1, energy, estrus, ground maize, microbial protein synthesis.*

CHEMICAL COMPOSITION ANALYSIS RESULTS ON SOME OF ENERGY AND MINERAL RICH INGREDIENTS ANIMAL FEED PRODUCTION FROM 2006 TO 2019

Vol 115. September, 2020. Pp. 52-62

Dao Duc Hao

Corresponding author: Dao Duc Hao. Tel: 0913397826. Email: daoduchao74@gmail.com

The statistics, data processing were allocated according to a completely on some of energy rich ingredients such as; corn, rice bran, wheat bran ... and mineral rich materials such as: dicanxiphotphate. The sample collected for 14 years from 2006 to 2019, Chemical composition quantified are: dry matter, crude protein, crude fat, crude fiber, neutral fiber, acid fiber, crude ash, calcium, phosphorus and starch.

Results compared to results in the book “Composition and nutritive value of animal feeds in Vietnam” " was published in 1995 and reprinted in 2001 by the National Institute of Animal Hasbandry is now National Institute of Animal Science, the results are less different that only enriching and diversifying data. The difference only raises a problem that of the plant is change of some chemical composition due to new varieties.

Adding some new materials, add new composition: 24 wheat samples, 72 extracted rice bran samples, 13 dried rice bran samples, 14 fresh rice bran samples, 465 dicanxiphotphate samples, starch component, neutral detergent fibre (NDF) component, acid detergent fibre (ADF) component,

Keywords: *Statistics, data processing, chemical components, animal feed*

CONSIDERING TEMPERATURE - HUMIDITY OF HOUSE AND DEFINING MIXTUREFEEDDIET SUITABLE FOR BACKYARD CHICKENSPERIOD FROM 1 TO 18 DAY - AGE AT TRA VINH

Vol 115. September, 2020. Pp. 63-76

Nguyen Thi Mong Nhi

Corresponding author: Nguyen Thi Mong Nhi. Tel: (+84)(91)8490731. Email: ntmnhi@tvu.edu.vn

This study was carried out from 28th October 2019 to 2nd January 2020 at experimental farm in veterinary husbandry of Tra Vinh University. Experience analyzed temperature zone for young chicken fed mix diet, there by evaluting effect of brooding floor and special rising spots temperature to growth performance as feed use of efficiency of chicken period 1 to 18 day - age. Processing research in showing temperature zone suitable for chicken from 25.4°C to 31.2°C with relative humidity of air middle as well as 65.79% of experimental period. Cloaca temperature change by day age, sex of chicken and time zone daily, index estimated from 39.32°C đến 40.77°C at those spots. Experiment was designed by completely randomized method consist of fourth treatments, every treatment repeated three times so total of young chickens which was assessed in growth rate and ability of feed conversion have 240 chickens. Most of livestock technical parameters show stable result under season convert climate condition. So that chicken herd growth well and illless through star phase. Body weight of chicken at 18 day - age from 172.8g to 185.0g/chick. The feed transferring was better with FCR achieve value ofmid range from 1.95kg to 2.16kg for all treaments and relatively suite of life with local condition and character of breeds.

Keywords: *Feed convertion ratio, weight gain,temperature zone*.

CURRENT SITUATION OF SWIFTLET FARMING HOUSE IN SOUNTHERN PROVINCES OF VIETNAM

Vol 115. September, 2020. Pp. 77-88

Dau Van Hai, Nguyen Thi Hong Trinh, Le Ba Chung, Pham Minh Quan, Nguyen Thi Anh and Do Tu Quan

Corresponding author: Dau Van Hai. Tel: 0918088570. Email: hai.dauvan@iasvn.vn

The study on current status of swiftlet farming was conducted in the Southern provinces, from January to June 2020. 1000 Swiftlet's houses were randomly selected, equivelent to 10% of local swiftlet's houses to survey (2019). Interview information is included in the questionnaire. Results reveal that most swiftlet's houses didn't have construction permits and the number of swiftlet's houses increased quictly from 2011 (reaching 93% by 2019). Swiftlet's houses were 1 to 4 floor-houses, of which 2-3 floor-houses were mostly (81.2%). Rate of houses applying method of allurement by sound was 100% and combining sound with odorants was 39.1%. Temperature and humidity: 94.7% of bird houses were determined, in which automatic determination accounted for 80.34%, 100% of the houses was installed with humidification systems. Sound: 100% houses used audio equipment inside and outside the house, working 24/24 inside, 11.61 hours/day outside. Light and ventilation were mostly from vents in the wall and bird doors. Bird's nest yield was 129.7 g/m2/year, harvested 9.32 times/year. Quality of nest: Type I (>9g/nest) 43.38%, type II (7-9g/nest) 36.49%, type III (<7g/nest) 20.13%. Management: the number of households with record of harvesting management accounts for 78.2%, percentage of households pre-processing nest was 25.4%, collecting fertilizers was 76.3%, disinfect inside of the swiftlet house was 84% and most of them used family labor.

Key words: *Sound, swiftlet, seduction, bird's nest yield, swiftlet.*

EFFECT OF OILS AND GRAPE SEED PROANTHOCYANIDIN EXTRACT ON RUMINAL FERMENTATION AND METHANE PRODUCTION IN DAIRY GOATS

Vol 116. October, 2020. Pp. 2-8

Lam Phuoc Thanh, Nguyen Thi Thu Ha and Tran Thi Thuy Hang

Corresponding author: Dr. Lam Phuoc Thanh; Tel: 09 7576 3555; Email: phuocthanh@ctu.edu.vn

An *in vitro* experiment was conducted to investigate effects of supplementing oil or in combination with grape seed proanthocyanidin (PA) extract on true digestibility, ruminal fermentation and methane (CH_4) emission in dairy goats. For this purpose, four non lactating dairy goats were received an adapted diet containing concentrate and elephant grass (40:60, in DM) for 7 days. Animals were then collected rumen

fluid before morning feeding to conduct batch *in vitro* fermentation. This study was carried out as a completely randomized design with 7 treatments and 4 replicates. A control diet consisted of concentrate and elephant grass at 40:60 while other 6 treatments were supplementation of 2.5% oil (either only soybean oil [S] or a mixture of soybean oil and tuna fish oil [SF]) combined without or with grape seed proanthocyanidin extract (contained 95% PA[P]) at 0, 0.4 and 0.8% DM, corresponding to Ctrl, SP_0, SFP_0, $SP_{0.4}$, $SP_{0.8}$, $SFP_{0.4}$ and $SFP_{0.8}$, respectively. Treatment diets had no effect on pH, NH_3-N concentration and *in vitro* true digestibility (P>0.05), however total VFA concentration at 48h incubation was greater in SFP_0 compared to that in Ctrl (P<0.05). Cumulative total gas production remained unchanged when feeding either oil alone or in combination withgrape seed PA extract (P>0.05). Methane (CH_4) concentration showed a strong drop in $SP_{0.8}$ and $SFP_{0.8}$ contrary to those in Ctrl and SP_0 (P<0.05). This resulted in decreased CH_4 production in both $SP_{0.8}$ and $SFP_{0.8}$ related to Ctrl (P<0.05), accounting for 33.57 and 34.90%, respectively. The present study demonstrates that feeding combination of grape seed PA extract at 0.8% DM with either soybean oil alone or a blend of soybean oil and tuna fish oil at 2.5% DM strongly suppresses CH_4 production without adverse effect on digestibility and ruminal fermentation in dairy goats.

Keywords: *digestibility, methane, oil, proanthocyanidin, ruminal fermentation*

EFFECTS OF GARLIC SUPPLEMENT ON GROWTH PERFORMANCE OF TAU VANG CHICKEN PERIOD 7-14 WEEKS OF AGE

Vol 116. October, 2020. Pp. 9-15

Pham Tan Nha and Nguyen Thi Kim Dong

Corresponding author: Pham Tan Nha. Mobile phone: 0985512504. Email: ptnha@ctu.edu.vn

A study was conducted to evaluate the effect of garlic supplement on the growth performance of Tau Vang chicken in the period of 7-14week old period. It was a completely randomized design with 5 treatments corresponding to 5 diets and 4 replications with 10 birds per experimental unit. The treatments were the different garlic supplement levels of 0,0.05, 0.1, 0.15 and 0.2% (in DM) to basal diet, corresponding to the G0, G0.05, G0.1, G0.15 and G0.2 treatments. The results showed that the daily intakes of DM, OM, CP, EE and ME were significantly higher (P<0.05) in the 3 last treatments (the G0.1, G0.15 and G0.2 treatments) compared with G0 treatment. The significantly higher daily weight gain, final live weight and the lower FCR were found for the G0.15 treatment (P<0.05). The garlic supplement in the diets of Tau Vang chicken improved the carcass, breast meat and thigh meat weights (P<0.05). It was concluded that garlic supplement at level of 0.15% (DM) in the diets gave higher growth performance and carcass values of growing Tau Vang chicken.

Key words: *Tau Vang chicken, garlic, nutrient intake, growth rate, carcass values*

RESPONSE OF REPRODUCTIVE PERFORMANCE OF RABBIT DOES TO ANTIOXIDANT VITAMIN C SUPPLEMENTATION IN DIETS

Vol 116. October, 2020. Pp. 16-25

Truong Thanh Trung and Nguyen Van Thu

Corresponding author: Truong Thanh Trung; Email: tttrung@ctu.edu.vn

An experiment was carried out to evaluate the effects of different supplement levels of ascorbic acid in diets on the reproductive performance of crossbred (New Zealand White breed x local breed) rabbits in three litters. The experiment was a completely randomized design with five treatments and four replications. One female rabbit at 4 - 4.5 months of age with average live weight at 2,500g was an experimental unit. The five treatments were different supplement levels of ascorbic acid (mg/kg DM diet) at 0, 125, 250, 375 and 500 mg, corresponding to C0, C125, C250, C375 and C500 treatments, respectively. The results showed that feeds and nutrients intake of rabbits in three litters were significantly increase (P<0.05) by increasing the supplement levels of ascorbic acid in diets. In the first litter, the litter size at birth, litter weight at birth, litter size at weaning and milk yield were significantly improved (P<0.05) by increasing supplement levels of ascorbic acid in diets with the highest values for C500 treatment with 7.00 kids and 361g, 6.50 kids and 72.3g/day, respectively. For the second and third litters, the milk yield were significantly improved (P<0.05) by gradually using ascorbic acid levels in diets but

they gave a negative result for C375 and C500 treatments. It was concluded that using ascorbic acid at 125mg/kg DM diet could improve reproductive performance of does.

Key words: *ascorbic acid, doe, milk yield, litter size at birth, rodents.*

EFFECTS OF DIFFERENT ASCORBIC ACID SUPPLEMENT LEVELS ON GROWTH RATE, NUTRIENTS DIGESTIBILITY AND ECONOMIC RETURN OF CROSSBRED RABBITS IN THE MEKONG DELTA OF VIET NAM

Vol 116. October, 2020. Pp. 26-33

Truong Thanh Trung and Nguyen Thi Kim Dong

Corresponding author: Truong Thanh Trung. Mail: tttrung@ctu.edu.vn

A study was conducted to evaluate the effects of different ascorbic acid supplement levels in the diets on growth performance, nutrients digestibility and economic return of growing crossbred (New Zealand White x local) rabbits. Sixty rabbits at 42 days of age were arranged in a completely randomized block design with 5 treatments and 3 replications. Four rabbits including 2 males and 2 females were in one experimental unit. Five treatments were 5 ascorbic acid levels adding to drinking water at 0, 250, 500, 750 and 1000 mg per one litter, corresponding to C0, C250, C500, C750 and C1000 treatments, respectively. The apparent nutrient digestibility and nitrogen retention of the rabbits were measured at 12 weeks of age in 7 days. This experimental period was 12 weeks. The results of the study showed that DM, CP and ME intakes were significantly different ($P<0.05$) among the treatments with the higher values for C500 treatments. The daily weight gain was significantly different ($P<0.05$) among treatments and it was 19.4, 20.2, 21.7, 18.2 and 18.0 g/day for C0, C250, C500, C750 and C1000 treatments, respectively. The profit was the highest for C500 treatment. The nutrients digestibility was significantly higher ($P<0.05$) for C500 treatment. It could be concluded that adding ascorbic acid to drinking water at 500 mg per litter should be used to feed growing crossbred rabbits for improving growth, digestible nutrients and economic return.

Keywords: *ascorbic acid, income, growth performance, nitrogen, rodents.*

EFFECT OF DIETARY LEVELS OF NEUTRAL DETERGENT FIBER (NDF) ON *IN VITRO* ORGANIC MATTER AND NDF DIGESTIBILITY WITH RUMEN FLUID OF BEEF CATTLE AS AN INOCULUM SOURCE

Vol 116. October, 2020. Pp. 34-41

Nguyen Binh Truong and Nguyen Van Thu

Corresponding author: Nguyen Binh Truong; Mobile phone: 0983377424; Email: nbtruong@agu.edu.vn

This experiment aimed to evaluate the effect of dietary NDF levels on *in vitro* feed digestion for further *in vivo* and performance studies. It was arranged according to the complete randomized design with 6 treatments and 3 replications. The treatments were 35, 41, 47, 53, 59 and 65% NDF corresponding to NDF35, NDF41, NDF47, NDF53, NDF59 and NDF65 treatment. The basal substrates (mixture) for the experiment included elephant grass (*Pennisetum purpureum*), *Operculia turpethum*, rice straw, broken rice, soybean extraction meal and urea with the fixed crude protein of 14.6 % (DM basis) for all the treatments. The *in vitro* DM and NDF digestibility were observed from 0 to 72 h by the method of Goering and Van Soest.

Results showed that organic matter digestibility (OMD) was significantly different ($P<0.05$) among the treatments at 24, 48 and 72 hincubation. At 72 h the *in vitro* OMD values of NDF35 (85.1%) and NDF41 (82.7%) treatments were significantly higher ($P<0.05$) than those of other treatments. The data also demonstrated that increasing the NDF levels in diets from 35 to 65% gradually reduced NDF digestibility (NDFD). The linear relationship between NDF levels (%) of the treatments and the NDFD was found with the function $y = -0.274x + 69.5$ and $R^2 = 0.683$, while this between NDF levels (%) and the *in vitro* OMD was the function $y=-0.576x + 105$ and $R^2 = 0.954$. In conclusion, increasing the NDF level from 35.0% to 65.0% in the mixture gradually decreased *in vitro* OM and NDF digestibility, and the reasonable treatments from 47 to 59% NDF could be selected for the coming *in vivo* and performance studies.

Keywords: *NDF levels, OMD digestion, mixture, rumen microbes, ruminants.*

THE USE OF WATER HYACINTH (*EICHHORNIA CRASSIPES*) FOR IMPROVING METABOLIZABLE ENERGY INTAKE, NUTRIENT DIGESTIBILITY AND ECONOMIC RETURN OF LOCAL YELLOW CATTLE

Vol 116. October, 2020. Pp. 42-47

Nguyen Thi Kim Dong and Nguyen Van Thu

Corresponding author: Nguyen Thi Kim Dong; Email: ntkdong@tdu.edu.vn

The objective of this study was to determine the optimum levels of water hyacinth (WH) in cattle rice straw diet by evaluating nutrient and energy intakes, digestibility and economic return. Four local male cattle with average live weight of 214.5 kg were arranged in a Latin square design with four treatments, which included fresh water hyacinth (WH) replacing rice straw at levels of 0, 25, 50 and 75% in the diets (DM basis) corresponding to the WH0, WH25, WH50 and WH75 treatments. The urea-molassesblock was supplemented in all the diets to balance CP intake for the all treatments. The results showed that daily DM, OM and NDF intakes were significantly different ($P<0.05$) among the treatments and they were gradually reduced from the WH0 to WH75 treatment due to the higher moiture content of WH. However the metabolizable energy (ME) intake was higher for the WH50 treatment, because of the digested DM improvement. The rumen pH, N-NH_3 and total VFA concentrations were not significantly different ($P>0.05$) among the treatments with a good rumen environment for microbial activities. It was also found that the daily weight gain was significantly different ($P<0.05$) among the treatments with the highest value for the WH50 treatment. The conclusion was that fresh WH could be replaced rice straw in cattle diet for improving dietary nutrient digestibility, metabolizable energy and possitive live weight change. The optimum level of WH replacement to rice straw in cattle diet could be 50%.

Keywords: *water plants, forages, ruminants, rumen parameters, growth*

IN VITRO METHANE AND CARBON DIOXIDE PRODUCTION AND ORGANIC MATTER DIGESTIBILITY AFFECTED BY PARA GRASS (*BRACHIARIA MUTICA*) REPLACEMENT TO RICE STRAW

Vol 116. October, 2020. Pp. 48-56

Nguyen Van Thu

Corresponding author: Nguyen Van Thu; Email: nvthu@ctu.edu.vn

The aim of the experiment was to evaluate the CH_4 and CO_2 production and organic matter digestibility (OMD) by replacing Para grass to rice straw as the main substrate. This experiment was arranged in a complete randomized design *in vitro* condition with 5 treatments and 3 replicates by using the glass syringe system. The treatments included 100% rice straw (PG0), 75% rice straw + 25% Para grass (PG25), 50% rice straw + 50% Para grass (PG50), 25% rice straw + 75% Para grass (PG75) and 100% Para grass (PG100) based on DM basis. The results indicated that *in vitro* CH_4 and CO_2 production (ml/g DOM) at 72 h were significantly different ($P<0.05$) among the treatments and gradually increased from PG0 (35.4) to PG100 treatment (65.7). The linear relationship between CH_4 production (ml/gDOM) and Para grass replacement to rice straw was closed with the function $y = 0.306x + 34.1$ ($R^2 = 0,972$). Similarly, the OM digestibility significantly different ($P<0.05$) among the treatments and was 42.0, 49.8, 56.8, 63.9 and 79.9% for the PG0, PG25, PG50, PG75 and PG100 treatment, respectively. It was concluded that there was an increase of *in vitro* GHG production and OMD when increasing the replacement levels of Para grass to rice straw, and the nitogen-free extract (NFE) had a possitiverelationto the methane production.

Keywords*: degradation, fermentation, local feed sources, roughages, ruminants.*

A STUDY ON NUTRIENT INTAKE, GROWTH PERFOMANCE AND ECONOMIC RETURN OF CROSSBRED RABBIT (NEW ZEALAND x LOCAL) SUPPLEMENTED CASSAVA TUBE AS A DIETARY ENERGY SOURCE

Vol 116. October, 2020. Pp. 57-61

Ho Xuan Nghiep

Corresponding author: Ho Xuan Nghiep; Email: hxnghiep@agu.edu.vn

This study aimed to evaluate potential benefits from supplementing Para grass with dried cassava chips in diets of growing rabbits. Sixty crossbred rabbits (local x New Zealand) with average initial live weight of 735±4.64g

and 8 weeks of age were allocated in a completely randomized design with 5 treatments and 3 replications and were fed 5 levels of dried cassava chips (0, 10, 20, 30 and 40 g/rabbit/day) as a energy supplement source to Para grass fed *ad libitum*. While soybean extraction meal and soybean waste were used to supply protein for adjustment of the same protein level of 11.5g/day/rabbit and Para grass was fed *ad libitum.* The results showed that enhancing the offer level of dried cassava chips (DC) from the 0 to 40 g DC (rabbit/day) in a basal diet of Para grass significantly ($P<0.05$) and gradually increased dry matter (DM), organic matter (OM), ether extraction (EE), neutral detergent fiber (NDF) and metabolizable energy (ME) intakes. The cassava supplementation also improved the growth and economic return. It was also found that there was a linear relationship between daily weight gain and DC supplementation with the function of $y = 0.196x + 16.1$ and $R^2 = 0.974$. Dried cassava chip should be used to enhance the rabbit growth rate and profits for producers.

Keywords: *carbohydrates, digestibility, N balance, Para grass, growing rabbit.*

PRELIMINARY RESULTS OF *IN VITRO* GREENHOUSE GASES PRODUCTION AND FEED DIGESTION AFFECTED BY DIFFERENT PROBIOTIC ADDITIONS WITH RUMEN FLUID OF BEEF CATTLE AS AN INOCCULUM SOURCE

Vol 116. October, 2020. Pp. 62-69

Le Van Phong and Nguyen Van Thu

College of Agriculture, Can Tho University, Vietnam

Corresponding author: Le Van Phong; Email: Le Thanh Phong@ctu.edu.vn

This study aimed to evaluate the gas, CH_4, CO_2 and organic matter digestibility affected by 4 different probiotics. It included two *in vitro* experiments, which were arranged in 2 similar completely randomized designs with 5 treatments and 3 replications. Five treatments of Exp1 were non-probiotic supplementation (NP) the others were 0.25% of Vime-Subtyl, Vime-Bacilac, Biotic and Calphovit supplementation (DM basis) to Para grass (*Brachiaria mutica*) as a basal substrate. In Exp 2, the same percentage and kinds of probiotic supplementation of Exp 1 were done, however the main substrate were 80 (%DM) Para grass and 20 (%DM) concentrate feed including broken rice and soybean extraction meal and crude protein level in the substrate was fixed of 14.0 % (DM).

The results show that in Exp 1, CH_4 production at 72h of Vime-Bacilac and Calphovit (04.3 and 93.5 ml/g DOM, respectively) was significantly lower value compared to the others ($P<0.05$). OM digestibility (%) of Control (49.8) was significantly lowest ($P<0.05$) than the others. The results of Exp 2 indicates that CH_4 production at 24 and 72h of Calphovit (88.7 and 117 ml/g DOM, respectively) was the lowest compared to the others ($P<0.05$). The conclusion is that *in vitro* CH_4 production was different by probiotic sources. The probiotics that reduce methane production well from high to low were Calphovit, Biotic, Vime-Subtyl and Vime-Bacilac.

Key words: *yeast culture, biotic, Calphovit, Vime Subtyl, Vime Bacilac, climate change*

A RESPONSE OF NUTRIENT INTAKE, NITROGEN RETENTION AND LIVE WEIGHT CHANGE OF BACH THAO GOAT FED DIETARY CABBAGE (*BRASSICA OLERACEA*) RESIDUES

Vol 116. October, 2020. Pp. 70-77

Ho Xuan Nghiep

Corresponding author: Ho Xuan Nghiep; Email: hxnghiep@agu.edu.vn

A study was implemented to evaluate the effects of replacing Para grass (*Brachiaria mutica*) by cabbage residue *(Brassica oleracea*) in the diets on feed utilization, rumen characteristics and daily weight gain in growing Bach Thao goat. It was a 4 x 4 Latin square using 4 male Bach Thao goats (24.3 ±0.92 kg). The treatments were replacing Para grass with 4 levels of cabbage residue (DM basis); 0, 25, 50 and 75% (CR0, CR25, CR50 and CR75). Concentrate and urea were supplied to balance level of protein in all treatments at 6.0 gCP/kg live weight. The experimental period was 14 days consisting of 7 days adaption and 7 days of sampling period. The results showed that DM intake was not different among the treatments which ranged from 705 to 760 g/day ($p>0.05$). Similarly CP intake tended to increase (149 -159 g/day) with increasing content of cabbage residue but not significantly different. As expected because of the lower NDF and ADF content in the cabbage residue, the NDF and ADF intakes reduced with increasing cabbage residue in the diets. Rumen pH, $N\text{-}NH_3$ and VFA concentrations were not significantly different ($p>0.05$) among the treatments It cab be concluded that

replacing para grass with cabbage residue up to 75% of the diet did not result in any adverse effects on feed digestibility and rumen parameters. However, Bach Thao goats fed with 50% replacement (CR50 treatment) resulted in better in growth gain.

Key words*: cabbage residue, Bach Thao goat, rumen environment, digestion*

EFFECTS OF UREA-LIME TREATED RICE STRAW ON RUMEN FERMENTATION EFFICIENCY, NUTRIENTS DIGESTIBILITY AND MICROBIAL NITROGEN SYNTHESIS IN SWAMP BUFFALOES

Vol 116. October, 2020. Pp. 78-85

N T T Giang, M Wanapat, V M Tuan, B V Phong, H T Hien and P B Duy

Corresponding author: Nguyen Thien Truong Giang, Email: nttgiangnias@gmail.com

This objective of this experiment was to determine effects of urea lime treatment of rice straw on rumen fermentation efficiency and nutrients digestibility in swamp buffaloes. Four rumen fistulated swamp buffaloes with initial weight were 353± 11 kg andwere randomly assigned to 2 treatments (T1 = untreated rice straw, T2 = 2% urea + 2% lime) according to T-test design. All treatments were fed ad libitum intake. Experimental time lasted for 21 days in which feed, feces, urine were collected during last 7 days and rumen fluid, blood were collected at last days for chemical analyzes. The dry matter intake and digestibility were improved significantly by using urea-lime treated rice straw (ULTRS) ($P < 0.05$). Rumen NH_3-N concentration were higher ($P < 0.05$) as compared with untreated rice straw (RS), while blood urea nitrogen was in normal ranges. The acetic acid concentration was decreased ($P < 0.05$) while propionic acid concentration and CH_4 prodution was increased ($P < 0.05$), thus acetic acid:propionic acid was subsequently lowered in buffaloes fed with 2% urea + 2% lime treated rice straw. Total viable bacteria, amylolytic, and cellulolytic bacteria were significantly enhanced by urea-lime rice straw treatment. The microbial protein synthesis and efficiency microbial N synthesis also were higher in urea-lime treated rice straw. Based on this study, it could be concluded that 2% urea + 2% lime treated rice straw improved digestibility of nutrients, rumen microbial population, rumen fermentation efficiency and enhanced microbial protein synthesis and efficiency of microbial N synthesis while the CH_4 production was lower than untreated rice straw.

Keywords: *Urea-lime, swamp buffaloes, rice straw, rumen fermentation, microbial protein*

A RESPONSE OF FEED UTILIZATION, NUTRIENT DIGESTIBILITY, GROWTH AND ECONOMIC RETURN OF CROSSBRED RABBITS TO REPLACEMENT OF BROCCOLI LEAVES *(BRASSICA OLERACEA)* TO PARA GRASS (*BRACHIARIA MUTICA*) AS A BASAL DIET

Vol 116. October, 2020. Pp. 86-92

Nguyen Thi Kim Dong

Corresponding author: Nguyen Thi Kim Dong; Email: ntkdong@tdu.edu.vn

The objective of the study was to evaluate the effects of Broccoli leaf replacement in the basal diets of Para grass on nutrient digestibility, growth performance and economic returns of crossbred rabbits. The sixty rabbits were arranged in a complete randomized design with 5 treatments and 3 replications. The treatments were Broccoli leaf (BL) replacement to paragrass (DM basis) at levels of 0 (BL0), 20 (BL20), 40 (BL40), 60 (BL60) and 80% (BL80). The dry matter (DM) intake was not significantly different among treatments. The CP intake was significantly higher ($P<0.01$) for the BL60 and BL80 treatments (12.2 and 12.5 g/rabbit/day, respectively) as compared to the others. The significantly higher daily weight gains (21.8 and 21.4 g/rabbit/day) were in the BL60 and BL80 treatments ($P<0.01$). The apparent digestibility of DM, OM, EE and NDF increased proportionally to the increasing levels of Broccoli leaf replacement in diets. The differences were statistically significant ($P<0.01$), except for EE digestibility ($P>0.05$). The nitrogen intake and nitrogen retention ranged from 1.31 to 1.42 g/kg $W^{0.75}$ and 0.70 to 0.78 g/kg $W^{0.75}$, however they were not significantly different among the treatments ($P>0.05$). The results of this study indicated that Broccoli leaves could be used as a plant protein source for feeding rabbits. The levels of Broccoli leaves from 60 to 80% (DM basis) in Para grass as basal diet gave better growth performance and economic benefits.

Key words*: Broccoli leaves, crossbred rabbits, nutrient digestibility, para grass, weight gain*

RESEARCH HIGHLIGHTS OF ANIMAL NUTRION AND FEEDSTUFFSS IN PERIOD 2016-2020 AT INSTITUTE OF ANIMAL SCIENCES FOR SOUTHERN VIETNAM

Vol 117. November, 2020. Pp. 2-10

Doan Duc Vu

Corresponding author: Doan Duc Vu; Tel: 0908240155; Email: doanducvu@yahoo.com

For pig farming, there are quite a few studies focusing on nutritional requirements, especially for amino acids, crude fiber, Ca, P ..., supplementation of DL, L-Methionene, organic minerals - vitamins, Biotin ... and adjust feed intake based on back fat and body condition score. For poultry, there are not many independent researches on nutrition and feed for poultry, but mainly combined experiments in the breeding research process. The experiments focused mainly on new breeds of chickens such as Noi Nam Bo chicken, Tre chicken and Ninh Hoa chicken. For the use of non-traditional feed, especially agricultural and herbal by-products, is an important direction in research of animal feed. In addition to taking advantage of available feed sources, limiting imports, contributing to stabilizing food security, the use of non-traditional feed also contributes to reducing environmental pollution and reducing the amount of antibiotic residues in food. For ruminants, studies focused mainly on diets, from dairy calves for meat to crossbred and purebred animals. In addition, a new technique has also been developed, which is the production of Fermented Total Mixed Ration (FTMR). Some researches go into the field of greenhouse gas emissions in ruminant husbandry to contribute to limiting climate change in parallel with intensive farming development.

Keywords: *research, animal nutriton, feedstuffs*

RESEARCH ONCOMPOSITION OF TOTAL MIXED RATIONFOR F1 CROSSBREED (BBB x LAI SIND) IN THE PERIOD FROM 13 TO 18 MONTHS OF AGE

Vol 117. November, 2020. Pp. 13-22

Cu Thi Thien Thu, Dang Thai Hai and Bui Quang Tuan

Corresponding author: Cu Thi Thien Thu. Email: cttthu@vnua.edu.vn. Tel: 0945692662

An experiment was conducted to determine the suitable formulaes of total mixed ration (TMR) for F_1 crossbreed (BBB × Lai Sind) in the period from 13 to 18 months of age. A total of 24 bulls were divided into 4 groups. All groups used the same diet ingredients such as cornmeal, soybean cake, beer brewers, molasses, urea, but different of fiber ingredients in each group. Group 1 used 20% untreated rice straw, group 2 used 20% urea treatedrice straw, group 3 used 20% whole crop maize silage and group 4 used 10% urea treated rice straw and 10% whole crop maize silage. The ingredients of TMR were mixed before every meal, elephant grass was choped 2-3cm short before TMR mixing. Bulls were fed freely 2 meals/day, drinking water freely. Mineral needs are met by a licking block thathang above the feeder in the barn. Each bull was raised individually, numbered to determine the criteria: bodyweight gain, daily feed intake. The experimental results showed that the bulls in group 3 (using whole crop maize silage) had a significantly higher bodyweight than the bulls in group 1 (using untreated rice straw), 553.50 and 537.66kg. Bulls in group 3 (using whole crop maize silage) had not much higher bodyweight than bulls in group 2 (using urea treated rice straw) and bulls in group 4 (using a combination of whole crop maize silage and urea treated rice straw). The treatment of rice straw with urea improved the nutritional value of rice straw, improved the average bodyweight gain of bulls (1.04 and 1.07 kg/day compared to 0.98 kg/day). Use diets with ME 9.5-10.0 MJ/kg and crude protein 14.0-15.0% in diet DM with combination of elephant grass – urea treated rice straw – whole crop maize silage gave highly efficiency (high average bodyweight gain, low feed conversion ratio and low feed cost per 1kg bodyweight gain, take advantage of using of agricultural by-products).

Keywords: *F1 crossbreed (BBB x Lai Sind),TMR, crude protein, urea treated rice straw, ensiled maize*

EFFECTS OF CATION-ANION SALTS SUPPLEMENTATION AND BUFFERING ON DAIRY CATTLE DIET TO PRODUCTIVITY AND HEALTHY

Vol 117. November, 2020. Pp. 23-33

Phan Tung Lam, Tang Xuan Luu, Tran Thi Loan, Dang Thi Duong, Khuat Thi Thu Ha, Nguyen Yen Thinh, Khuat Thanh Long, Phung Thi Dieu Linh, Phung Quang Truong and Ngo Dinh Tan

Corresponding author: Dr. Ngo Dinh Tan; Tel: 0973213986; Email: ngodinhtanbv@gmail.com

The objection of this study was evaluation of feeding method to prevetion of metabolism disorder in dairy cow. The trial were divivingon 2 periods as dry period (60 days before calving) and during early lactation (100 days).

The location of trial in BaVi Cattle and Forage Research Center and Animal Biotechnology Centre (ABC) from January to June, 2019. The both regions, forty dairy cattle were randomized in two groups in each group in 20 cows (group 1 is control and group 2 is experimental) with similarly on body weight, BCS, milk yield, lactation. Two groups were similarly with ration and nutitional value, the experimenal group (group 2) on 60 days before delivery was supplementation with Magnesium sulphate ($MgSO_4$.7H2O) (34%), Ammonium Chloride (NH_4Cl) (59%), Ammonium sulphate ($(NH_4)_2SO_4$) (1.5%), Calcium carbonate ($CaCO_3$) (5.5%); on early lactation was supplementation with 13% Sodium bicarbonate ($NaHCO_3$); 13% sodium sesquicarbonate ($Na_3H(CO_3)_2$; 6% magesium oxide (MgO); 26% sodium bentonite ($Al_2H_2Na_2O_{13}Si_4$); 12% calcium carbonate ($CaCO_3$) và 30% potassium carbonate (K_2CO_3). The results were showed that supplementation of buffer mixtures at different stage in the experiment was effected on feed intake, milk protein and milk fat were also effect in the experiment. The group 2 was maintaining the rumen pH, urine ketone above incidence ketosis and milk fever better when compared with group 1.

Keywords: *Dairy cow, foster, metabolic disease*

EFFECTS OF CORNSTARCH IN ELEPHANT GRASS DIETS ON GREENHOUSE GAS EMISSIONS, DIGESTIBILITY AND PROTEIN ACCUMULATION RATE OF SIND CROSSBRED BEEF CATTLE

Vol 117. November, 2020. Pp. 35-46

Nguyen Van Thu

Corresponding author: Nguyen Van Thu. Tel: 0918549422. Email: nvthu@ctu.edu.vn

This experiments (Exp) was implemented at Can Tho University to evaluate the greenhouse gas emissions, feed utilization, rumen parameters and nitrogen retention of beef cattle. Four male Lai Sind cattle (277 ± 12.3 kg) were allowcated in a 4x4 Latin square design. The treatments were B0, B15, B30, B45 corresponding to the 0, 15, 30 and 45 % of ground maize (DM) supplementing to the basal diet of elephant grass. The results indicated that when the ground maize supplementation from 0 - 45% in cattle diets, the CH_4 and CO_2 emissions (L/day, L/kg DMI, L/kg DDM and L/kg KL) were not significantly different among the treatments ($P>0.05$), however there was a significant reduction of greenhouse gas production (L/kg DWG) was found ($P<0.05$) because of the improvement of daily weight gain for the maize suppementation treatment with level of 45%. The increase of rumen propionic acid concentration was gradually found from the B0 to B45 treatment, however no improverment of microbial nitrogen synthesis in rumen and nitrogen retention of the cattle was found. In conclusion that increasing from 0 to 45% maize supplementation to basal diet of elephent grass, no reduction of greenhouse gases of beef cattle was found.

Keywords***:*** *methane, ruminants, fermentation, soluble carbohydrate, supplementation*

EFFECT OF GARLIC POWDER ON GROWTH PERFORMANCE AND RESISTANCE AGAINST DISEASE OF LAI CHOI CHICKENS

Vol 117. November, 2020. Pp. 49-57

Hoang Thi Anh Phuong and Nguyen Van Hoai

Corresponding author: Hoang Thi Anh Phuong; Tel: 0834626465; Email: htaphuong@ttn.edu.vn

The study was conducted to assess influence of supplementary raw garlic powder on the growth performance, meat quality and resistance against disease of broiler chickens. The total of 100 birds were equally divided into four treatments and raised over a period of 15 weeks.The treatments with different levels of supplementary garlic powder ratios of 0, 0.5, 1 and 1.5 percent called T1, T2, T3 and T4 respectively. The results showed that the survival rates of chickens in treatmens with supplementation of raw garlic powder to diets was 100%. Broiler chickens fed garlic supplemented diets had higher body weight and weight gain than those fed the control diet, in which chickens supplemented to 1.5% dietary garlic powder had highest body weight and weight gain. The body weight of 15-week-age chickens of T1, T2, T3 and T4 were 2144, 2144.1, 2181.5 and 2285 g/bird, respectively ($P<0.05$). The average weight gain of chickens of T1, T2, T3 and T4 were 20.07, 20.07, 20.43 and 21.41 g/bird/day, respectively ($P<0.05$). The average feed intake and feed conversion ratio of the birds were not significantly influenced by dietary treatments ($P>0.05$). The average feed conversion ratio of birds was 2.88 ($P>0.05$). Chicken supplemented with garlic powder in the diet was better against coccidiosis than the control.

Keywords*: garlic powder, growth performance, meat quality, disease, chickens.*

EFFECT OF ENERGY LEVELS IN DIET ON GROWTH AND REPRODUCTIVE PERFORMANCE OF HOA LAN DUCKS

Vol 117. November, 2020. Pp. 59-71

Nguyen Thi Hong Trinh, Dau Van Hai, Nguyen Ba Chung and Hoang Tuan Thanh

Corresponding author: Nguyen Thi Hong Trinh; Tel: 0975829470; Email: trinhias@gmail.com

The experiment was conducted in a duck household in Tien Giang province from 4/2019-9/2020 to evaluate the effect of energy levels on growth and reproductive performance of Hoa Lan ducks. 1800 one-old ducks (360 males and 1440 females) were arranged according to the Completely Randomized Design (CRD) with 3 energy levels or 3 treatments (2850, 2900 and 2950 kcal / kg DM for 0-8 weeks of age; 2700, 2750 and 2800 kcal / kg DM for 9-20 weeks of age and 2650, 2070 and 2750 kcal / kg DM for the laying period) with 3 replicates. Results reveal that energy levels did not effected to survival rate, egg weight and hatching rate. However, in higher energy levels, body weight of ducks at 20 weeks of age was higher (1812, 1855.7, 1872.3g / male and 1637.0, 1673.7, 1700.7 g/female respectively) and laying age was sooner 3-4 days. The laying rate, egg production/hen/52 weeks of laying, feed consumption per 10 eggs in treatment 1 were 60.37%, 219.8 egg and 3.54 kg; in treatment 2 were 70.86%, 221.5 egg and 3.48kg; in treatment 3 were 60.56%, 220 egg and 3.52 kg, there was a significant difference between treatment 1 and 2. Therefor, treatment 2 feeding ducks with: ME 2900 kcal/kgDM, protein 20% for 0-8 week of age; ME 2750 kcal/kgDM, protein 15% for 9-20 week of age and ME 2070 kcal/kgDM, protein 17% for laying period has the best productive performance.

Keywords: *body weight, egg yield, Growth, FCR/10 eggs, Hoa Lan duck*

SOME BIOLOGICAL CHARACTERISTICS AND CURRENT STATUS OF HONEY EXPLOITATION FROM THE HIMALAYAN GIANT HONEYBEE (*APIS LABORIOSA*) IN NA HANG DISTRICT, TUYEN QUANG PROVINCE

Vol 117. November, 2020. Pp. 75-84

Pham Duc Hanh, Nguyen Thong Thanh and Nguyen Duc Lam

Corresponding author: Pham Duc Hanh; Email: hanhbees@yahoo.com

In Vietnam, the Himalayan giant honeybee (*Apis laboriosa*) is found at high elevation locations (>900m a.s.l.) in several Northern and Central mountainous provinces. This species nests on cliff faces as high as some tens to hundreds meters above ground level and migrates seasonally. Due to nesting on inaccessible sites, *A. laboriosa* is poorly understood. These observations were carried out during June and July, 2020 in Giang Chi village, Sinh Long commune, Na Hang district, Tuyen Quang province, to identify some biological characteristics, seasonal information, nesting behavior, and current honey exploitation methods of *A. laboriosa.*

This is the first time that 8 colonies of *A. laboriosa,* nestedon a cliff face, was found in Na Hang district, Tuyen Quang province (22°35'24"N, 105°20'9"E) at an altitude of 970m a. s. l. They reside there annually from February to July. They build a single comb with the dimensions from 0.8m x 0.6m to 1.6m x 1.5m. Worker cell diameter of this species is 5.9mm, the largest worker cell-size among honeybee species. Exo-parasite prevalence (i.e. percentage of bees with parasites) on *A. laboriosa* was low, with 0% of the bee louse (*Megabraula* sp., n=500) on adult bees and 1.33% of smaller mite (*Tropilaelaps* sp., n=600) on sealed brood cells.

Honey hunters in Na Hang exploit honey by the traditional way. On our visit, they made a bamboo ladder that they leaned against the cliff face near the bee nests. Then they used bamboo rods to poke at the upper honey portion of the bee nests. Honey comb broken from the nest dropped down into a huge "funnel" beneath. This way of exploiting honey caused the death of numerous adult workers; two brood combs dropped to the ground during the operation, possibly killing those colonies. Honey yield was low, between 2.5 liters to 4.3 liter per colony. The honey collected was bright yellow, fragrant, and highly sweet but watery (27.3% moisture). It was sold directly to customers at 500.000VND/liter (approximately US $21.50/liter). Income from honey and beeswax constituted a small proportion of household income (from 14% to 16%).

Although putting the honey hunters at high risk of injury and harms the wild bee population, the honey hunting methods of local villagers showed advantages of bee conservation. During the operation, most of the brood combs had not been destroyed, the next generations of bees were continuing to emerge, and the colonies did not abscond until the end of the honey season.

Keywords: *Giant honeybee, Apis laboriosa, honey hunter, bee conservation*.

CHALLENGES AND RESEARCH ORIENTATIONS FOR ANIMAL FEED IN VIETNAM

Vol 118. December, 2020. Pp. 1-12

La Van Kinh

Corresponding author: La Van Kinh. Tel: 0913916201. Email: kinh.lavan@iasvn.vn

Along with the population growth, the increasing demand for food for humans has required the growing growth of the livestock industry and the demand for animal feed is increasing. According to Alltech 2019, in the last 5 years, the growth rate of animal feed in the world is 14.5% and in 2019 it is 3% higher than 2018, reaching 1.1 billion tons. In Vietnam, in the last 5 years, the growth rate of food production has reached nearly 10% / year. As the demand for animal feed increases, the competition between human food and animal feed is getting fiercer. Challenges to the feed industry are posed by consumers and society more and more, higher and more difficult. That is how to get enough food for humans and animals, give the animal the least food and produce the most product, the quality of the product should be high, the environment is least affected, and the rights of animals respect.

Keywords: *Animal feed, research orientation, food nutrition.*

SELECTION FOR STABILIZING PRODUCTIVITY OF V27 SUPER MEAT DUCK LINE

Vol 118. December, 2020. Pp. 13-23

Le Thanh Hai, Duong Xuan Tuyen and Le Van Trang

Corresponding author: Le Thanh Hai. Tel: 0918.567547, Email: haivigova@yahoo.com.vn

The selection for stability of production on meat-type V27 line was conducted from the 2016 to 2019 at VIGOVA duck breeding farm. Selection method based on estimates of breeding values (EBV) by best linear unbiased prediction (BLUP) in 4 generations with 2 traits included: body weight at 7- weeks- old and egg production at 42-weeks-old. Estimation of genetic parameters by restricted maximum likelihood (REML) method, estimates of breeding values by BLUP and multi-trait animal models on PEST 4.2.3 and VCE 6.0.2 software. Genetic and phenotypic trends were analyzed by linear regression on Excel 2016 software. The results showed that corresponding heritability coefficients of body weight at 7-weeks-old, egg production at 42-weeks-old and egg weight at 38 to 42 weeks-old were 0.42, 0.31 and 0.59. Genetic correlation (r_G) between body weight and egg production at 42 weeks of age was -0.06; between body weight and egg weight at 38 to 42 weeks of age was 0.56; between egg production at 42 weeks of age and egg weight at 38 to 42 weeks of age was 0.03. Body weight at 7 weeks of age was not significant change while egg production increased 0.81 eggs/generation. Body weight at 42 weeks of age on male and female ducks were 3663.00 – 3682.67 g and 3190.00 – 3242.74 g. Laying age of the V27 line were 166 – 168 days of age, egg production/42 laying weeks were 211,33 - 212,38 egg/female, FCR/10 eggs 3.60 – 3.63 kg, egg weight were 88.16 – 88.62 g, fertility and hatchability were 92.40 – 92.69% and 73.99 – 74.27%, respectively.

Key words: *BLUP, meat-type V27 duck line, genetic parameter, egg production.*

RESEARCH ON PROCESSING OF PASSION FRUIT PEEL AS FEED FOR DAIRY CATTLE IN MOC CHAU – SON LA

Vol 118. December, 2020. Pp. 24-33

Le Van Ha, Nguyen Van Quang and Nguyen Xuan Trach

Corresponding author: Le Van Ha. Tel: 0982303780; Email: levanhasl80@gmail.com

This research aimed to evaluate the possibility to process passion fruit peel as feed for dairy cattle in Moc Chau district from January to October, 2019. Three silage formulae were tested in the field, including: CT1: 75% passion fruit peel + 20% dry corn cob + 5% molasses, CT2: 75% passion fruit peel + 20% bagasse + 5% molasses, CT3: 75% passion fruit peel + 10% dry corn cob + 10% bagasse + 5% molasses; and 02 fermented total mixed rations (FTMR1 and FTMR2) were also tested. The mixed materials in each formular were compacted layer by layer in plastic bags on the dairy farm. The silages were evaluated after 0, 30, 60 and 90 days, and the FTMRs after 21 days of ensilage based on sensory criteria, pH, chemical composition as well as the feed intake by the dairy cow. Two silage formulae, viz, CT1 and CT3, showed good results according to

sensory evaluation, pH, chemical composition as well as feed intake. Both of these formulae were used for further studies on lactating cows. Formula FTMR2 gave good results according to sensory evaluation, pH, chemical parameters as well as feed intake. Formula FTMR2 was then used for further studies on lactating cows, while FTMR1 for heifers.

Keywords: *Passion fruit peel; Silage; Dairy cows; Moc Chau*

RESEARCH TO DETERMINE DILUTION MEDIUM AND METHODS OF FREEZING SHEEP SEMEN IN THE PRODUCTION RAMS FROZEN SEMEN

Vol 118. December, 2020. Pp. 34-44

Dao Van Lap, Le Ba Que, Phung The Hai, Luong Anh Dung, Nguyen Thi Thu Hoa, Pham Vu Tuan, Le Th Loan, Phan Van Hai, Kieu Thang and Do Chien Thang

Corresponding author: Dao Van Lap; Email: daovanlap86@gmail.com

The experiment was conducted on 600 semen samples of 10 rams (05 Phan Rang and 05 Dorper rams) which are 14-17 months, to determine the extenders and the freezing semen methods to produce ram frozen semen. There are three different extenders (CUE; TRIS and VNE), and three different freezing methods (slow freezing, programmed temperature - P1; quick freezing, programmable temperature - P2 and quick freezing, manually - P3). The results showed that the VNE extender gives the best quality of sperm after thawing ($P < 0.05$). Then the results of TRIS and CUE, respectively. Namely motility was 47.76%; 43.69% and 37.53%; abnormal sperm was 22.40%; 23.13% and 24.12%; The rate of live sperm reached 68.54%; 65.63% and 63.05%. The quick freezing method, programmed temperature (P2) has the best sperm quality after thawing such as motility, the rate of abnormal sperm and live sperm ($P < 0.05$). Method P2 showed the post-thaw semen qulity result that motility reached 48.66%; the rate of abnormal sperm was 24.18%; rate of live sperm was 67.52%.

Keywords*: Dilution medium, freezing method, semen, ram, thawing, sperm motility, abnormal sperm*